CHAPTER 4

LAND USE PATTERNS AND CHANGES THEREIN

Land use means utilization of land in a particular area. Land use pattern includes types of land and how much land is being utilized under different uses. Land is basic resource of human society and land use is the surface utilization of all developed and vacant land on specific point at a given time and space. It is a systematic arrangement of various classes of land on the basis of certain similar characteristics mainly to identify and understand their fundamental utility, intelligently and effectively in satisfying the needs of human society (Chowdaiah, 2001). Agriculture land use firstly studies the land under different uses like net sown area, agricultural potential land, fallow land, forest land etc. (Sohal, 1979). Land use is very vital to understand the geographical adjustment of agricultural resources. It is also very important resource for man, so it should be put for right use according to its capability and according to its type. Fertile land should be used for cultivation purposes and infertile land should be used for non-agricultural purposes. Thus, land use classification helps the planner to make rational land use planning, because land resources are the most important national wealth. Land capability depends upon factors such as relief features, climate, Soil, vegetation, socio- economic and institutional factors. Today, the population pressure is increasing at a faster rate so the land is put under cultivation more to fulfill the growing
demand of food grains. Pawar and Phule (2006) have observed that in view of increasing pressure of population on land and growing demand of food and other materials, the pattern of land utilization has acquired a special significance in developing countries like India, because with increase in population, area under cultural uses also increases and consequently it will lead to decline in cultivated area.

Thus, to know the land use patterns in Punjab-Haryana Plains, an attempt is made in this chapter to discuss the land use pattern, 2005-06 and changes within the land use pattern in the study region.

**Land Use Pattern - 2005-06**

In overall land use pattern of Punjab Haryana Plains, forest land had occupied 3.51 per cent area, Land not available for cultivation accounted for 10.95 per cent area, cultivable waste land constituted 0.90 per cent, current fallow land to the tune of 2.80 per cent and net sown area covered 81.84 per cent area of the total reporting area (Table 4.1 and Fig. 4.1).

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Land Use</th>
<th>Per Cent to Total Reporting Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Forest Land</td>
<td>3.51</td>
</tr>
<tr>
<td>2.</td>
<td>Land not Available for Cultivation</td>
<td>10.95</td>
</tr>
<tr>
<td>3.</td>
<td>Cultivable Waste Land</td>
<td>0.90</td>
</tr>
<tr>
<td>4.</td>
<td>Current Fallow Land</td>
<td>2.80</td>
</tr>
<tr>
<td>5.</td>
<td>Net Sown Area</td>
<td>81.84</td>
</tr>
<tr>
<td><strong>Total Reporting Area</strong></td>
<td><strong>100.00</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Source:** Statistical Abstract of Punjab, 2006

**Forest land (Fig. 4.2)**

Forest land comprises 3.51 per cent of total reporting area in the study region. It varies from 0.2 per cent in Sirsa district to 31.86 per cent in
Overall Land Use Patterns in Punjab-Haryana Plain: 2005-06

- Net Sown Area, 81.84%
- Forest Land, 3.51%
- Non-Agricultural Land, 10.95%
- Cultivable Waste Land, 0.90%
- Current Fallow Land, 2.80%
Hoshiarpur district of the study area. The derived results are shown in table 4.2 and fig. 4.2 which portrays the following four categories:

1. **Areas of high proportion of forest land (>10 per cent)**

   This category covers the districts of Hoshiarpur, Nawanshahr, Rupnagar and S.A.S. Nagar. This category is found in a compact belt which runs along the Shiwaliks from north to south direction. These districts are having hills, dissected and undulating topography, and number of seasonal streams (Choes). In these districts, soil erosion occurs during rainy season. Due to all these prevailing physical conditions cultivation of crops is not possible. Thus, most of land is under forests.

2. **Areas of moderate proportion of forest land (5-10 per cent)**

   An area of moderate proportion of forest land includes only two districts, namely Yamunanagar and Gurdaspur. In Yamunanagar share of forest land is 8.72 per cent of the total occurrence. The topography of these areas is combination of high and low hills with piedmont plains which is again unfavourable for cultivation of crops. All these reasons are responsible for moderate proportion of forest land.

3. **Areas of low proportion of forest land (1-5 per cent)**

   Amritsar, Kapurthala, Jalandhar, Firozpur, Faridkot, Moga, Tarn Taran, Bathinda, Sangrur, Ludhiana, Mansa, Patiala, Fatehgarh Sahib, Panchkula, Kaithal, Panipat, Mahendragarh, Rewari and Gurgaon districts fall in this
category of the study area. It varies from 3.92 per cent in Patiala district to 1.03 per cent in Mahendragarh district. Most of the districts fall in this category which is Amritsar, Kapurthala, Tarn Taran, Ludhiana, Patiala, Fatehgarh Sahib, Jalandhar, Sangrur and Mansa. These are having flat land, fertile soil and well developed agricultural infrastructure. These are agriculturally developed areas of the study region, therefore, farmers also prefer to grow crop, which leads to low proportion of forest land in these districts. In Panchkula and Gurgaon districts, most of the land is under non-agricultural uses, Mahendragarh and Rewari have mostly sandy soil and patches of rocky surfaces which are responsible for low share of forest land in these districts of the study region.

4. Areas of very low proportion of forest land (<1 per cent)

Out of 38, eight districts fall in this category namely, Muktsar, Sirsa, Jind, Ambala, Karnal, Bhiwani, Sonepat and Faridabad. The percentage of forest land is recorded low in these areas i.e. less than 1.00 per cent. Muktsar, Sirsa and Bhiwani are the districts where most of land is put under fodder, oilseeds, cotton and pulses cultivation, because or rugged and sandy topography. On the other hand, in case of Karnal, Sonepat and Jind districts, most of the land is under food grains cultivation. In case of Faridabad and Ambala districts, most of the area is under non-agricultural activities. So, all these reasons are responsible for low share of forest land in this category.
## Table 4.2
Land Use Patterns in Punjab - Haryana Plains 2005-06
Per Cent to Total Reporting Area

<table>
<thead>
<tr>
<th>District</th>
<th>Forest Land</th>
<th>Land Not available for cultivation</th>
<th>Cultivable Waste Land</th>
<th>Current Fallow Land</th>
<th>Net Sown Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gurdaspur</td>
<td>6.27</td>
<td>11.97</td>
<td>0.57</td>
<td>0.00</td>
<td>81.20</td>
</tr>
<tr>
<td>Amritsar</td>
<td>3.79</td>
<td>8.71</td>
<td>0.00</td>
<td>3.41</td>
<td>84.09</td>
</tr>
<tr>
<td>Tarn Taran</td>
<td>2.07</td>
<td>7.47</td>
<td>1.66</td>
<td>1.66</td>
<td>90.00</td>
</tr>
<tr>
<td>Kapurthala</td>
<td>1.20</td>
<td>17.37</td>
<td>0.00</td>
<td>0.00</td>
<td>81.44</td>
</tr>
<tr>
<td>Jalandhar</td>
<td>2.26</td>
<td>7.52</td>
<td>0.00</td>
<td>0.00</td>
<td>90.23</td>
</tr>
<tr>
<td>Nawana Shahr</td>
<td>12.60</td>
<td>10.24</td>
<td>1.57</td>
<td>3.15</td>
<td>72.44</td>
</tr>
<tr>
<td>Hoshiarpur</td>
<td>31.86</td>
<td>8.55</td>
<td>0.29</td>
<td>0.00</td>
<td>59.29</td>
</tr>
<tr>
<td>Rupnagar</td>
<td>26.62</td>
<td>14.39</td>
<td>1.44</td>
<td>1.44</td>
<td>56.12</td>
</tr>
<tr>
<td>S.A.S. Nagar</td>
<td>16.22</td>
<td>15.32</td>
<td>0.00</td>
<td>0.90</td>
<td>67.57</td>
</tr>
<tr>
<td>Ludhiana</td>
<td>2.72</td>
<td>14.13</td>
<td>0.00</td>
<td>0.27</td>
<td>82.88</td>
</tr>
<tr>
<td>Firozpur</td>
<td>2.28</td>
<td>7.41</td>
<td>0.00</td>
<td>0.19</td>
<td>90.11</td>
</tr>
<tr>
<td>Faridkot</td>
<td>1.36</td>
<td>11.56</td>
<td>0.00</td>
<td>0.00</td>
<td>87.07</td>
</tr>
<tr>
<td>Muktsar</td>
<td>0.76</td>
<td>6.44</td>
<td>1.89</td>
<td>4.55</td>
<td>86.36</td>
</tr>
<tr>
<td>Moga</td>
<td>1.35</td>
<td>10.31</td>
<td>0.00</td>
<td>1.35</td>
<td>87.00</td>
</tr>
<tr>
<td>Bathinda</td>
<td>2.37</td>
<td>9.50</td>
<td>0.00</td>
<td>0.00</td>
<td>88.13</td>
</tr>
<tr>
<td>Mansa</td>
<td>1.40</td>
<td>6.54</td>
<td>0.00</td>
<td>3.27</td>
<td>88.79</td>
</tr>
<tr>
<td>Sangrur</td>
<td>1.39</td>
<td>10.16</td>
<td>0.40</td>
<td>0.40</td>
<td>87.65</td>
</tr>
<tr>
<td>Patiala</td>
<td>3.92</td>
<td>11.45</td>
<td>0.30</td>
<td>1.51</td>
<td>82.83</td>
</tr>
<tr>
<td>Fatehgarh Sahib</td>
<td>1.74</td>
<td>9.57</td>
<td>0.00</td>
<td>0.00</td>
<td>88.70</td>
</tr>
<tr>
<td>Ambala</td>
<td>0.65</td>
<td>11.69</td>
<td>0.65</td>
<td>0.00</td>
<td>87.01</td>
</tr>
<tr>
<td>Panchkula</td>
<td>3.51</td>
<td>36.84</td>
<td>3.51</td>
<td>15.79</td>
<td>40.35</td>
</tr>
<tr>
<td>Yamunanagar</td>
<td>8.72</td>
<td>18.02</td>
<td>0.58</td>
<td>0.00</td>
<td>72.67</td>
</tr>
<tr>
<td>Kurukshetra</td>
<td>0.00</td>
<td>8.93</td>
<td>0.60</td>
<td>0.00</td>
<td>90.48</td>
</tr>
<tr>
<td>Kaithal</td>
<td>1.32</td>
<td>12.28</td>
<td>0.44</td>
<td>0.00</td>
<td>85.96</td>
</tr>
<tr>
<td>Karnal</td>
<td>0.41</td>
<td>12.60</td>
<td>3.66</td>
<td>4.07</td>
<td>79.27</td>
</tr>
<tr>
<td>Panipat</td>
<td>2.31</td>
<td>15.38</td>
<td>5.38</td>
<td>6.15</td>
<td>70.77</td>
</tr>
<tr>
<td>Sonipat</td>
<td>0.47</td>
<td>13.15</td>
<td>3.76</td>
<td>14.08</td>
<td>68.54</td>
</tr>
<tr>
<td>Rohtak</td>
<td>0.00</td>
<td>3.59</td>
<td>8.38</td>
<td>2.99</td>
<td>85.03</td>
</tr>
<tr>
<td>Jhajjar</td>
<td>0.00</td>
<td>6.36</td>
<td>8.30</td>
<td>5.24</td>
<td>80.10</td>
</tr>
<tr>
<td>Faridabad</td>
<td>0.48</td>
<td>20.67</td>
<td>0.96</td>
<td>6.73</td>
<td>71.15</td>
</tr>
<tr>
<td>Gurgaon</td>
<td>2.96</td>
<td>26.30</td>
<td>0.74</td>
<td>8.89</td>
<td>61.11</td>
</tr>
<tr>
<td>Rewari</td>
<td>1.32</td>
<td>12.58</td>
<td>0.66</td>
<td>1.99</td>
<td>83.44</td>
</tr>
<tr>
<td>Mahendragarh</td>
<td>1.03</td>
<td>18.04</td>
<td>0.52</td>
<td>1.55</td>
<td>78.87</td>
</tr>
<tr>
<td>Bhiwani</td>
<td>0.64</td>
<td>9.44</td>
<td>0.00</td>
<td>5.15</td>
<td>84.76</td>
</tr>
<tr>
<td>Jind</td>
<td>0.36</td>
<td>7.55</td>
<td>0.00</td>
<td>0.36</td>
<td>91.73</td>
</tr>
<tr>
<td>Hisar</td>
<td>0.00</td>
<td>9.88</td>
<td>0.00</td>
<td>12.10</td>
<td>78.02</td>
</tr>
<tr>
<td>Fatehabad</td>
<td>0.00</td>
<td>8.84</td>
<td>0.00</td>
<td>4.42</td>
<td>86.75</td>
</tr>
<tr>
<td>Sirsa</td>
<td>0.23</td>
<td>4.68</td>
<td>0.00</td>
<td>2.58</td>
<td>92.51</td>
</tr>
<tr>
<td>REGION</td>
<td>3.51</td>
<td>10.95</td>
<td>0.90</td>
<td>2.80</td>
<td>81.84</td>
</tr>
</tbody>
</table>

Fig. 4.2

PUNJAB-HARYANA PLAINS
Forest Land
2005-06

Per Cent of TRA

- >10
- 5 - 10
- 1 - 5
- > 1
- Nil

Region's Average = 3.51

Source: Statistical Abstracts of Punjab and Haryana - 2006
5. Areas with no forest land

This category covers only 5 districts of the study region namely Fatehabad, Hisar, Rohtak, Jhajjar and Kurukshetra. Kurukshetra, Rohtak and Jhajjar are agriculturally sound districts of the study region, so most of the area in these districts is under cultivation. In Fatehabad and Hisar districts, most of the area is under sandy soils. Here, the average annual rainfall is also very low and natural vegetation cover is also thin. All these reasons are responsible for no share of forest land in these five districts of the study region.

Land not Available for Cultivation (Fig. 4.3)

10.95 per cent land is not available for cultivation of the total reporting area of the study region. The proportion varies from 3.59 to 36.84 per cent in Rohtak and Panchkula districts respectively. Table 4.2 and fig. 4.3 shows its spatial variations through the following categories:

1. Areas with high proportion of land not available for cultivation (>12 per cent)
2. Areas with moderate proportion of land not available for cultivation (8-12 per cent)
3. Areas with low proportion of land not available for cultivation (<8 per cent)

1. Areas with high proportion of land not available for cultivation (>12 per cent)

14 districts namely Kapurthala, Ludhiana, S.A.S. Nagar Rupnagar, Kaithal, Karnal, Panchkula, Yamunanagar, Panipat, Sonipat, Mahendragarh, Rewari, Gurgaon and Faridabad fall under this category. The development of industrial area in Ludhiana, Panchkula, Gurgaon and Faridabad districts leads to high percentage of non-agricultural land. In case of other districts,
Fig. 4.3

PUNJAB-HARYANA PLAINS

Land not Available for Cultivation

2005-06

Per Cent of TRA

> 12
8-12
< 8

Region's Average = 10.95

Source: Statistical Abstracts of Punjab and Haryana - 2006
expansion of settlements and presence of urban centers resulted in high proportion of land not available for cultivation.

2. **Areas with moderate proportion of land not available for cultivation (8-12 per cent)**

   This category includes the districts of Gurdaspur, Amritsar, Hoshiarpur, Faridkot, Moga, Bathinda, Sangrur, Patiala, Fatehgarh Sahib, Nawanshahr, Ambala, Kurukshetra, Fatehabad, Hisar and Bhiwani. These are agriculturally developed districts. Here the industrial development is moderate and urban development is also low. Due to all these reasons, share of land not available for cultivation is recorded moderate.

3. **Areas with low proportion of land not available for cultivation (<8 per cent)**

   This category of low proportion of land not available for cultivation is lying in rest of the entire study area. Here, the proportion varies from 3.59 per cent in Rohtak district to 7.52 per cent in Jalandhar district. Tarn Taran, Jalandhar, Firozpur, Muktsar, Sirsa, Mansa, Jind, Rohtak and Jhajjar districts form this category. The low proportion of land under non-agricultural use in Tarn Taran, Jalandhar, Firozpur, Mansa, and Muktsar is due to suitable land for agriculture. The land under settlements and industries is also less in these districts. All these reasons are responsible for low share of land not available for cultivation in these districts.

**Cultivable Waste Land (Fig. 4.4)**

Area under cultivable waste land is 0.90 per cent of total reporting area. It varies from 0.29 per cent in Hoshiarpur district to 8.38 per cent in Rohtak and Jhajjar districts. It shows that average cultivable waste land is not uniform in the study region. The spatial variations in the study regions are
Fig. 4.4

PUNJAB-HARYANA PLAINS
Cultivable Waste Land
2005-06

Source: Statistical Abstracts of Punjab and Haryana - 2006
shown with the help of table 4.2 and fig. 4.4 which depict the following categories:

1. Category of high share of cultivable waste land (>1 per cent)
2. Category of moderate share of cultivable waste land (0.5 to 1 per cent)
3. Category of low share of cultivable waste land (<0.5 per cent)
4. Category of no cultivable waste land

1. Category of high share of cultivable waste land (>1 per cent)

Nawanshahr, Rupnagar, Panchkula, Muktsar, Tarn Taran, Jhajjar, Sonepat, Panipat, Karnal and Rohtak districts form this category. The main reasons for high share of cultivable waste land in Nawanshahr, Rupnagar and Panchkula districts are undulating and dissected topography, soil erosion due to seasonal streams (choes), presence of hilly areas etc. Due to all these factors, the share of cultivable waste land is over 1.0 per cent and as a result the proportion of cultivable waste land is high, whereas in case of Jhajjar district, undulating sandy plains and occurrences of sand dunes are responsible for high share of cultivable waste land.

2. Category of moderate share of cultivable waste land (0.5-1 per cent)

Only Eight districts namely, Mahendragarh, Rewari, Gurgaon, Faridabad, Kurukshetra, Ambala, Yamunanagar and Gurdaspur fall in this category. Due to the presence of flat terrain and developed agricultural infrastructure, most of the land in these districts is devoted to agricultural uses which minimise the share of cultivable waste land in these districts.

3. Category of low share of cultivable waste land (<0.5 per cent)

This category covers small part of the study area. Out of 38 districts, 4 districts fall in this category namely, Hoshiarpur, Sangrur, Patiala and Kaithal.
Developed irrigation facilities, availability of modern techniques for farming, fertile soil, and flat topography are responsible for low share of cultivable waste land in above mentioned districts of the study region.

4. Category of no cultivable waste land

Out of 38 districts, 16 districts are in this category of no cultivable waste land namely, Amritsar, Kapurthala, Jalandhar, S.A.S. Nagar, Ludhiana, Firozpur, Faridkot, Moga, Bathinda, Mansa, Fatehgarh Sahib, Bhiwani, Jind, Hisar, Fatehabad and Sirsa. Most of the above mentioned districts are agriculturally healthy and are having flat land, fertile soils, well developed irrigational facilities, etc. which are the main reasons accounted for no cultivable waste land

Current Fallow Land (Fig. 4.5)

Current fallow land occupies 2.80 per cent of the total reporting area. Highest percentage of current fallow land is found in Panchkula district (15.79 per cent) and lowest (0.19 per cent) in Firozpur district. Spatial distribution of current fallow land is shown with the help of table 4.2 and fig. 4.5 which depict the following three categories.

1. Area of high share of current fallow land (>5 per cent)
2. Area of moderate share of current fallow land (1-5 per cent)
3. Area of low share of current fallow land (<1 per cent)
4. Area of no share of current fallow land

1. Area of high share of current fallow land (>5 per cent)

This category of high share of current fallow land includes the districts of Panchkula, Hisar, Bhiwani, Jhajjar, Gurgaon, Faridabad, Sonipat and Panipat. It varies from 15.79 per cent in Panchkula district to 5.15 per cent in
PUNJAB-HARYANA PLAINS
Current Fallow Land
2005-06

Fig. 4.5

Source: Statistical Abstracts of Punjab and Haryana - 2006
Bhiwani district. In case of Bhiwani and Jhajjar districts, the main reason is the occurrence of sand dunes, whereas in Sonipat and Panipat flood plains are responsible. But in Gurgaon and Faridabad districts presence of rocky hills and piedmont plains in Panchkula; are the main reasons which account for high share of current fallow land.

2. Area of moderate share of current fallow land (1-5 per cent)

Tarn Taran, Amritsar, Rupnagar, Nawanshahr, Moga, Muktsar, Mansa, Patiala, Sirsa, Fatehabad, Karnal, Rohtak, Mahendragarh and Rewari are the districts form this category. Major reason responsible for moderate share of current fallow land are flat topography, developed agricultural infrastructure, fertile soil, irrigational facilities, etc.

3. Areas of low share of current fallow land (<1 per cent)

This category exists in Firozpur, S.A.S. Nagar, Ludhiana, Sangrur and Jind districts. In all these districts, topography is flat and suitable for agriculture, so these districts are agriculturally healthy districts. Owing to all these reasons, share of current fallow land is low in these parts of the study area.

4. Areas of no share of current fallow land

This category of no share of current fallow land comprises Gurdaspur, Kapurthala, Jalandhar, Hoshiarpur, Faridkot, Bathinda, Fatehgarh Sahib, Ambala, Yamunanagar, Kurukshetra and Kaithal districts. In these districts, no current fallow land is found in 2005-06, because most of the current fallow is brought under cultivation through reclamation, development of irrigation, high degree of mechanization and introduction of short duration variety of crops.
Net Sown Area (Fig. 4.6)

Net sown area is part of cultivated area which is sown almost once in one agricultural year. In Punjab-Haryana plains 81.84 per cent of the total reporting area is net sown area. It is recorded maximum (92.51 per cent) in Sirsa district and minimum of (40.35 per cent) in Panchkula district. Existing spatial pattern of net sown area are shown in table 4.2 and fig. 4.6 which highlight the following three categories.

1. Area with high proportion of net sown area (>85 per cent)
2. Area with moderate proportion of net sown area (75-85 per cent)
3. Area with low proportion of net sown area (<75 per cent)

1. Areas with high proportion of net sown area (>85 per cent)

This category comprises Tarn Taran, Jalandhar, Faridkot, Firozpur, Moga, Muktsar, Fatehgarh Sahib, Bathinda, Sangrur, Sirsa, Fatehabad, Mansa, Kaithal, Jind, Kurukshetra, Ambala and Rohtak districts. These districts are blessed with flat topography, fertile soils, and developed irrigation facilities. In these districts, farmers are also aware of the use of fertilizers and HYVs of seeds and new techniques of farming. Owing to these reasons, net sown area has recorded high share in these districts of the study region.

2. Areas with moderate proportion of net sown area (75-85 per cent)

Eleven Out of 38 districts fall in the category of moderate proportion of net sown area. These are Gurdaspur, Amritsar, Kapurthala, Ludhiana, Patiala, Karnal, Hisar, Bhiwani, Jhajjar, Mahendragarh, and Rewari. In Gurdaspur district, the area under forest land is recorded high because of hilly and undulating topography. Whereas in Kapurthala district land not available for agriculture is recorded high which leads to moderate proportion of net sown
Fig. 4.6

PUNJAB-HARYANA PLAINS
Net Sown Area
2005-06

Per Cent of TRA

> 85
75-80
< 75

Region’s Average = 81.84

Source: Statistical Abstracts of Punjab and Haryana - 2006
area. In other districts growth of urban centers, marketing centers, dense settlement, industrialization etc. are the main reasons for moderate share of net sown area.

3. Area with low proportion of net sown area (<75 per cent)

Hoshiarpur, Rupnagar, S.A.S. Nagar, Nawanshahr, Panchkula, Yamunanagar, Panipat, Sonipat, Gurgaon and Faridabad districts fall in this category. Main reasons responsible for low share of net sown area in these districts are infertile soils, lack of adequate irrigational facilities, number of urban centers and industrial development. In these districts most of the land is put under non-agricultural purposes and consequently it led to low proportion of net sown area.

Conclusion

The foregoing discussion reveals that there are great variations in land use patterns of the study region in 2005-06. Among the land use categories, forest land occupies 3.51 per cent area of the total reporting area. The areas with dissected and undulating topography are having high proportion of forest land; on the other hand, areas which are having flat terrain, well developed agricultural infrastructure are agriculturally healthy areas. The land not available for cultivation accounted for 10.95 per cent area of the total reporting area. The share of land not available for cultivation is high in those areas which are more urbanized and have developed network of roads. Whereas, areas with deprived socio-economic progress are having low share of land not available for cultivation. Share of cultivable waste land is low, which is 0.90 per cent of the total reporting area. Current fallow land covers 2.80 per cent of the total reporting area. Share of fallow land is high along Shiwaliks, where
sandy soils and physical impediments are more feasible. Share of net sown area is 81.84 per cent of the total reporting area in the study region. The percentage of this category is recorded high in areas having flat topography, well developed irrigation facilities, etc. On the other hand, the undulating areas, where extensive amount of terrain is not accessible for farming owing to physical restriction has lowest land under net sown area.

**Changes in Land Use Pattern**

Change in land use pattern is the outcome of physical and non physical environment. Any change in physical and non physical environment leads to changes in land use pattern, (Riar, 2000). Change in land use pattern provides an index for measuring the stage of agricultural development in an area. Physical parameters, human factors and economic factors are also responsible for land use changes of a particular area. With the increasing pressure of population, the only prospect of increasing food grains production and meeting the needs of food lie in expansion of cultivated area, reduction of fallow land, increase in net sown area and enhancing per unit yield of crops (Sohal, 1979). Population growth and urbanisation are the main instruments of change in land use patterns. Other important factors include improvements in road accessibility, increasing demand for food grains, increasing demand of land for settlement purposes, etc. All these are the key factors responsible for changes in land use pattern in the study region during the 1965-66 to 2005-06. The study region has undergone considerable changes in land use patterns during the research period. The net sown area in the study region has increased from 76.19 per cent to 83.77 per cent during 1965-66 to 1985-1986 with positive change of 7.58 per cent. It portrays that forest land has increased from 1.90
per cent in 1965-66 to 3.68 per cent in 1985-86 with positive volume change of 1.78 per cent and it is also noticed that forest land has increased during 1965-66 to 2005-2006 i.e. from 1.90 per cent to 3.51 per cent respectively. From 1985-86 to 2005-06 forest land has turn down significantly from 3.68 per cent to 3.51 per cent with a negative volume of change of 0.17 per cent. Land not available for cultivation has declined from 11.56 per cent in 1965-66 to 9.38 per cent in 1985-86 with negative change of 2.19 per cent. In the same way, land not available for cultivation has lost its area from 11.56 per cent in 1965-66 to 10.95 per cent in 2005-06. During 1985-86 land not available for cultivation has increased from 9.37 per cent to 10.95 per cent area in 2005-06 and registered a positive volume of change of 1.58 per cent. Area under cultivable waste land has declined from 3.90 per cent to 1.16 per cent during 1965-66 to 1985-86 and from 1.16 per cent in 1985-86 to 0.90 per cent in 2005-06. The overall change in cultivable waste land is 3.90 per cent to 0.90 per cent in 1965-66 to 2005-06 with negative volume of change of 2.74 per cent 0.26 per cent and 3 per cent respectively. Current follow land has experienced negative volume of change of 4.42 per cent from 1965-66 to 1985-66 and 3.64 per cent from 1965-66 to 2005-06 and has recorded positive volume of change during 1985-86 to 2005-06 of 0.78 per cent.

To make an in-depth study of changes in land use patterns and factors responsible for them during 1965-66 to 2005-06 in the study region, the chapter is further divided into three sections. These are such as:

A. Changes in land use patterns: 1965-66 to 1985-86
B. Changes in land use patterns: 1985-86 to 2005-06
C. Changes in land use patterns: 1965-66 to 2005-06
A. Changes in Land Use Patterns: 1965-66 to 1985-86 (Fig. 4.7 and Table 4.3)

From 1965-66 to 1985-86 the land use pattern has changed significantly. The forest land has experienced a positive volume of change of 1.78 per cent, land not available for cultivation and the study region during 1965-66 to 1985-86 has experienced 2.19 per cent of negative volume of change category of cultivable waste land has also experienced negative volume of change of 2.74 per cent. A negative volume of change of 4.42 per cent has recorded under category of current fallow land. At the same time there was a significant volume of change of 7.58 per cent has recorded under the category of Net sown area.

Table 4.3
Changes in Land Use Patterns in Punjab-Haryana Plains: 1965-66 to 1985-86

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Land Use</th>
<th>Per Cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Forest Land</td>
<td>1.78</td>
</tr>
<tr>
<td>2.</td>
<td>Land not Available for Cultivation</td>
<td>-2.19</td>
</tr>
<tr>
<td>3.</td>
<td>Cultivable Waste Land</td>
<td>-2.74</td>
</tr>
<tr>
<td>4.</td>
<td>Current Fallow Land</td>
<td>-4.42</td>
</tr>
<tr>
<td>5.</td>
<td>Net Sown Area</td>
<td>7.58</td>
</tr>
</tbody>
</table>


Forest Land (Fig. 4.8)

The study region has experienced positive volume of change of 1.78 per cent from 1965-66 to 1985-86. Spatial distribution of forest land in the study region was not uniform, some areas had recorded positive volume of change and some had experienced negative volume of change. The derived results are shown in fig. 4.8 and table 4.4 which are discussed as follow.
Changes in Land Use Patterns in Punjab-Haryana Plains: 1965-66 to 1985-86

Net Sown Area 7.58

Forest Land 1.78

Land not Available for Cultivation -2.19

Cultivable Waste Land, -2.74

Current Fallow Land, -4.42
1. Areas with high positive volume of change: (> 1 per cent)

This category included Amritsar, Tarn Taran, Hoshiarpur, Rupnagar, Faridkot, S.A.S. Nagar, Ludhiana, Sangrur, Mansa, Kaithal, Karnal, Panipat, Sonipat, Bhiwani, Mahendragarh, Gurgaon and Faridabad districts of the study region. Districts of Hoshiarpur, Rupnagar and S.A.S. Nagar were found in the Shiwalik hills or foothills of Shiwaliks. In these districts, topography was favourable for plantation of trees rather than crop cultivation. Here, the trees were also planted on hills and on slopes to check soil erosion by seasonal streams which resulted in positive volume of change under forest land while in other districts generous boost in forested area from 1965-66 to 1985-86 had been mainly the result of afforestation work by the Forest Department in Punjab-Haryana Plains during the study period resulted in high positive volume of change under forest land.

2. Areas with low positive volume of change (<1 Per cent)

Gurdaspur, Kapurthala, Jalandhar, Moga, Muktsar, Bathinda, Nawanshahr, Fatehgarh Sahib, Patiala, Jind, Kurukshetra, Rohtak, Jhajjar and Rewari districts formed this category. In these districts, trees were planted along railways, road sides and canals. Kapurthala, Jalandhar, Fatehgarh Sahib, Patiala, Kurukshetra, Jind and Rohtak districts had fertile alluviums which were more suitable for the cultivation of crops than plantation of trees. Gurdaspur and Nawanshahr districts had found in the foothill zone of Shiwaliks. Here most of the land was not used for crop farming because of water logging and soils erosion, etc. Owing to all these the positive volume of change in forest land was low.
Table 4.4
Changes in Land Use Patterns in Punjab - Haryana Plains 1965-66 to 1985-86
Per Cent to Total Reporting Area

<table>
<thead>
<tr>
<th>District</th>
<th>Forest Land</th>
<th>Land Not available for cultivation</th>
<th>Cultivable Waste Land</th>
<th>Current Fallow Land</th>
<th>Net Sown Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gurdaspur</td>
<td>0.51</td>
<td>-1.54</td>
<td>-1.25</td>
<td>-11.59</td>
<td>13.87</td>
</tr>
<tr>
<td>Amritsar</td>
<td>1.21</td>
<td>-0.49</td>
<td>-10.46</td>
<td>-7.48</td>
<td>17.21</td>
</tr>
<tr>
<td>Tarn Taran</td>
<td>1.09</td>
<td>2.48</td>
<td>-6.07</td>
<td>-3.55</td>
<td>6.18</td>
</tr>
<tr>
<td>Kapurthala</td>
<td>0.50</td>
<td>-17.96</td>
<td>-0.21</td>
<td>-3.23</td>
<td>15.81</td>
</tr>
<tr>
<td>Jalandhar</td>
<td>0.02</td>
<td>-5.82</td>
<td>0.00</td>
<td>-3.40</td>
<td>9.21</td>
</tr>
<tr>
<td>Nawanshahr</td>
<td>0.07</td>
<td>-6.27</td>
<td>0.00</td>
<td>-0.23</td>
<td>6.07</td>
</tr>
<tr>
<td>Hoshiarpur</td>
<td>22.78</td>
<td>-24.37</td>
<td>-1.75</td>
<td>-4.29</td>
<td>7.63</td>
</tr>
<tr>
<td>Rupnagar</td>
<td>12.46</td>
<td>-13.26</td>
<td>-3.13</td>
<td>-1.69</td>
<td>5.62</td>
</tr>
<tr>
<td>S.A.S. Nagar</td>
<td>8.37</td>
<td>-19.18</td>
<td>-3.17</td>
<td>-4.48</td>
<td>18.46</td>
</tr>
<tr>
<td>Ludhiana</td>
<td>1.11</td>
<td>-1.44</td>
<td>-5.33</td>
<td>-2.40</td>
<td>8.06</td>
</tr>
<tr>
<td>Firozpur</td>
<td>-0.25</td>
<td>0.38</td>
<td>-3.51</td>
<td>-12.80</td>
<td>16.18</td>
</tr>
<tr>
<td>Faridkot</td>
<td>1.00</td>
<td>2.14</td>
<td>0.00</td>
<td>0.00</td>
<td>-0.23</td>
</tr>
<tr>
<td>Muktsar</td>
<td>0.84</td>
<td>-0.95</td>
<td>0.00</td>
<td>0.00</td>
<td>-0.17</td>
</tr>
<tr>
<td>Moga</td>
<td>0.83</td>
<td>-0.58</td>
<td>0.00</td>
<td>0.00</td>
<td>0.13</td>
</tr>
<tr>
<td>Bathinda</td>
<td>0.88</td>
<td>2.78</td>
<td>-0.37</td>
<td>-2.58</td>
<td>-0.71</td>
</tr>
<tr>
<td>Mansa</td>
<td>1.15</td>
<td>0.67</td>
<td>-0.30</td>
<td>-2.76</td>
<td>0.47</td>
</tr>
<tr>
<td>Sangrur</td>
<td>1.62</td>
<td>-0.19</td>
<td>-2.90</td>
<td>-1.71</td>
<td>3.18</td>
</tr>
<tr>
<td>Patiala</td>
<td>0.65</td>
<td>1.88</td>
<td>-2.37</td>
<td>-15.52</td>
<td>15.36</td>
</tr>
<tr>
<td>Fatehgarh Sahib</td>
<td>0.49</td>
<td>2.65</td>
<td>-2.37</td>
<td>-13.23</td>
<td>12.47</td>
</tr>
<tr>
<td>Ambala</td>
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<td>1.61</td>
<td>-3.20</td>
<td>-0.46</td>
<td>2.83</td>
</tr>
<tr>
<td>Panchkula</td>
<td>-3.27</td>
<td>3.66</td>
<td>-4.00</td>
<td>-1.29</td>
<td>2.33</td>
</tr>
<tr>
<td>Yamunanagar</td>
<td>-1.45</td>
<td>2.38</td>
<td>-3.15</td>
<td>-0.95</td>
<td>1.26</td>
</tr>
<tr>
<td>Kurukshetra</td>
<td>0.96</td>
<td>-12.70</td>
<td>-7.11</td>
<td>-3.43</td>
<td>22.28</td>
</tr>
<tr>
<td>Kaithal</td>
<td>1.77</td>
<td>-8.27</td>
<td>-3.70</td>
<td>-1.78</td>
<td>11.98</td>
</tr>
<tr>
<td>Karnal</td>
<td>2.15</td>
<td>-4.28</td>
<td>-4.77</td>
<td>-2.67</td>
<td>9.56</td>
</tr>
<tr>
<td>Panipat</td>
<td>2.05</td>
<td>-4.71</td>
<td>-4.00</td>
<td>-2.34</td>
<td>8.80</td>
</tr>
<tr>
<td>Sonipat</td>
<td>2.51</td>
<td>-4.88</td>
<td>-3.33</td>
<td>-0.74</td>
<td>6.44</td>
</tr>
<tr>
<td>Rohtak</td>
<td>0.75</td>
<td>-0.75</td>
<td>-3.58</td>
<td>-3.31</td>
<td>6.88</td>
</tr>
<tr>
<td>Jhajjar</td>
<td>0.59</td>
<td>-1.03</td>
<td>-2.70</td>
<td>-3.71</td>
<td>6.95</td>
</tr>
<tr>
<td>Faridabad</td>
<td>1.22</td>
<td>6.70</td>
<td>-5.11</td>
<td>-4.84</td>
<td>2.02</td>
</tr>
<tr>
<td>Gurgaon</td>
<td>2.66</td>
<td>6.19</td>
<td>-0.37</td>
<td>-1.79</td>
<td>-6.68</td>
</tr>
<tr>
<td>Rewari</td>
<td>0.20</td>
<td>-2.96</td>
<td>-0.55</td>
<td>-4.33</td>
<td>7.65</td>
</tr>
<tr>
<td>Mahendragarh</td>
<td>1.32</td>
<td>3.83</td>
<td>-4.46</td>
<td>-0.27</td>
<td>-0.97</td>
</tr>
<tr>
<td>Bhiwani</td>
<td>2.56</td>
<td>-0.01</td>
<td>-5.90</td>
<td>-0.81</td>
<td>2.15</td>
</tr>
<tr>
<td>Jind</td>
<td>0.98</td>
<td>-5.75</td>
<td>-2.46</td>
<td>-0.78</td>
<td>0.16</td>
</tr>
<tr>
<td>Hisar</td>
<td>-0.36</td>
<td>2.61</td>
<td>-3.37</td>
<td>-7.24</td>
<td>8.36</td>
</tr>
<tr>
<td>Fatehabad</td>
<td>-0.16</td>
<td>3.51</td>
<td>-3.18</td>
<td>-6.28</td>
<td>6.11</td>
</tr>
<tr>
<td>Sirsa</td>
<td>-0.24</td>
<td>-0.57</td>
<td>-2.73</td>
<td>-11.99</td>
<td>15.54</td>
</tr>
<tr>
<td><strong>REGION</strong></td>
<td>1.78</td>
<td>-2.19</td>
<td>-2.74</td>
<td>-4.42</td>
<td>7.58</td>
</tr>
</tbody>
</table>

Volume of Change in Forest Land
PUNJAB-HARYANA PLAINS
1965-66 to 1985-86

Per Cent
> 1
< 1
Region's Average = 1.78

Source: Abstracts of Punjab and Haryana - 1966 & 1986
3. **Areas with high negative volume of change (> 1 per cent)**

This category was found in districts of Panchkula, Ambala and Yamunanagar districts. The forested area in these parts had declined due to the industrialisation, urbanisation and development of transport facilities etc.

4. **Areas with low negative volume of change (< 1 per cent)**

Negative change of less than 1 per cent had recorded in Firozpur, Sirsa, Fatehabad and Hisar districts of the study region. In these districts of the study region, topography was the main reason responsible for low negative volume of change in forest land. In these districts, most of the areas had covered with sandy soil which was not suitable for plantation of trees or even for the cultivation of crops. Here the annual average rainfall was also very low (less than 30 cms), which was again a major reason responsible for low negative volume of change in forest land.

**Changes in Land Not Available for Cultivation (Fig. 4.9)**

Area under land not available for cultivation in the study region recorded negative volume of change of 2.19 per cent from 1965-66 to 1985-86. This negative volume of change was basically due to land which was not available for cultivation and declared as forest land in most districts. The spatial variations in the volume of change in area under land not available for cultivation were shown in fig. 4.9 and table 4.4 which contained the following categories. These were:

1. **Areas with high negative volume of change (> 5 per cent)**

   This category was found in 2 separate belts. One belt was observed along the Shiwaliks foot hill plains and flood plains of Beas River. The second belt was lying along the Ghaggar flood plains. Hoshiarpur, Kapurthala,
PUNJAB-HARYANA PLAINS
Volume of Change in Land not Available for Cultivation
1965-66 to 1985-86

Region's Average = -2.19

Source: Abstracts of Punjab and Haryana - 1966 & 1986
Jalandhar, Nawanshahr, Rupnagar, S.A.S. Nagar, Kurukshetra, Kaithal and Jind were the districts formed in this category. Hoshiarpur, Nawanshahr, Rupnagar and S.A.S. Nagar districts of the study region had hills, undulating and dissected topography, numerous seasonal streams, etc. while Kapurthala and Jalandhar districts were lying in the flood plains of rivers Beas and Satluj. Owing to all these reasons most of the land in these districts was not available for cultivation and was declared as forest land by the Union Ministry of Forest, Agriculture and Environment. Thus, it is the main reason for high negative volume of change of land not available for cultivation in these districts. The second belt comprised Kurukshetra, Kaithal and Jind districts which were also lying in the flood plains of Ghaggar and Nakodar. So, here most of the area was also not available for cultivation and remain barren which was the main reason for high negative volume change of land not available for cultivation.

2. Areas with moderate negative volume of change (1-5 per cent)

Moderate negative volume of change in land not available for cultivation was seen in the districts of Gurdaspur, Ludhiana, Karnal, Panipat, Sonipat, Jhajjar and Rewari. In Gurdaspur district, the main reason for moderate negative volume of change of land not available for cultivation was that of which had been brought under afforestation, soil conservation measures and improvement in the methods of farming, etc. While in the districts of Ludhiana, Karnal, Panipat, Sonipat and Jhajjar though most of the waterlogged area had been reclaimed yet little bit still exit. All these reasons were responsible for the negative volume of change of moderate extent in land not available for cultivation.
3. Category of low negative volume of change (< 1 per cent)

This category covered Amritsar, Moga, Muktsar, Sirsa, Sangrur, Bhiwani and Rohtak districts of the study region. In this category, volume of change was recorded less than 1 per cent. Firstly in these districts of the study areas were having flat lands with soil richness developed agricultural infrastructure, irrigational facilities; thus most of the land was under cultivation of different crops etc. secondly most of the districts were lagging behind infrastructure, urban centers and industrial development. As a result, these areas were having low volume of change of land not available for cultivation.

4. Category of high positive volume of change (> 5 per cent)

This category was formed around urban centers and cities. It included Gurgaon and Faridabad districts of the study region during 1965-66 to 1985-86. Here increase in rapid industrialization, expansion of residential areas both urban as well as rural; increase in transport facilities, etc. were responsible for high volume of positive change in land not available for cultivation.

5. Category of low positive volume of change (< 5 per cent)

This category was found in two different belts. One belt was included foothill zone of Shiwaliks and Ghaggar plains which comprised the districts of Panchkula, Ambala, Yamunanagar, Patiala and Fatehgarh. The districts of Tarn Taran, Firozpur, Faridkot, Bathinda, Mansa, Fatehabad, Hisar and Mahendragarh districts formed the second belt of low positive volume of change in land not available for cultivation. Presence of physical hindrances such as undulating and dissected topography, hilly area and number of
seasonal streams, in Panchkula, Ambala, Yamunanagar and flood plains of Ghaggar River in Patiala district were the main factors which created problems in socio-economic development. In other districts poor soil productivity, lack of transport facilities, problem of water logging and lack of major towns and urban centers were factors which were responsible for low positive volume of change in land not available for cultivation.

Changes in Cultivable Waste Land (Fig. 4.10)

Cultivable waste land had experienced negative volume of change in overall land use patterns during 1965-66 to 1985-86. In 1965-66 cultivable waste land occupied 3.90 per cent area and in 1985-86, its share was 1.16 per cent area of the total reporting area of study region. Thus, 2.74 per cent negative volume of change was recorded during 1965-66 to 1985-66. Developments of agricultural infrastructure, roads, railways, improvement in irrigational facilities were the key factors responsible for negative volume of change in cultivable waste land. To know the spatial variations of change in the extent of cultivable land fig. 4.10 and table 4.4 was mapped which portrait the following four categories.

1. Areas with high negative volume of change (> 5 per cent)

This category of high negative volume of change was found in different patches. Six districts namely Amritsar, Tarn Taran, Ludhiana, Kurukshetra, Faridabad and Bhiwani formed this category. In these districts, due to reclamation of waterlogged area was the main cause for bringing more area under crop cultivation which led to high negative volume of change in cultivable waste land in this category.
PUNJAB-HARYANA PLAINS
Volume of Change in Cultivable Waste Land
1965-66 to 1985-86

Source: Abstracts of Punjab and Haryana - 1966 & 1986
2. Areas with moderate negative volume of change (1-5 per cent)

This category of moderate change in cultivable waste land covered large parts of the study area. Gurdaspur, Hoshiarpur, Rupnagar, S.A.S. Nagar, Panchkula, Fatehgarh Sahib, Sangrur, Patiala, Ambala, Yamunanagar, Firozpur, Sirsa, Fatehabad, Kaithal, Karnal, Jind, Hisar, Panipat, Sonepat, Rohtak, Jhajjar and Mahendragarh were included in this category. In most of these districts, unfriendly topography was the main reason for moderate change. For example in some areas, undulating and dissected topography, seasonal streams were still creating problems and in some areas there was presence of sand dunes in the southern parts. Rest of the districts were lying in flood prone areas and were facing the problem of waterlogging. Owing to all these reasons, this category had experienced moderate negative volume of cultivable waste land.

3. Areas with low negative volume of change (< 1 per cent)

Low negative volume of change in cultivable waste land had recorded in five districts namely, Kapurthala, Bathinda, Mansa, Rewari and Gurgaon. All these areas had recorded very low percentage of change in cultivable waste land i.e. less than 1 per cent. In these districts, a restricted proportion of land is under cultivation due to different reasons. In Moga, Bathinda, Mansa most of the land was sandy and infertile soil. In Kapurthala topography was the main hindrance because it was lying in the flood plains of Beas River. Lastly in Rewari and Gurgaon most of the area was under Aravalli hills which also had created problems in the way of reclamation of land for farming. Due to the above mentioned reasons low negative volume of change in the cultivable waste land was recorded in this category.
4. Areas with no change

This category included five districts namely Nawanshahr, Jalandhar, Moga, Faridkot and Muktsar. In these districts there was no change in cultivable waste land from 1965-66 to 1985-86 because during this time period, these districts did not register any amount of land under cultivable waste land category.

Changes in Current Fallow Land (Fig. 4.11)

The reduction in area under current fallow land had been recorded in all the districts of the study area during 1965-66 to 1985-86. Increase in population pressure, development of infrastructure, awakening among the farmers etc. have led to significant decline in current fallow land. But this change is unique in its spatial distribution. These changes are shown in fig. 4.11 and table 4.4 which represent four categories. These are as follow:

1. Areas with high negative volume of change (> 6 per cent)

This category of high negative volume of change included eight districts of the study region namely Gurdaspur, Amritsar, Firozpur, Fatehgarh Sahib, Patiala, Sirsa, Fatehabad and Hisar. High negative volume of change in these districts was the result of reclamation work, use of new agricultural technology and government policies. All these factors brought successful results and land under this category had declined during the study period.

2. Area with moderate negative volume of change (3-6 per cent)

This category was well scattered in the study area and covered the districts of Tarn Taran, Kapurthala, Jalandhar, Hoshiarpur, S.A.S. Nagar,
Volume of Change in Current Fallow Land
1965-66 to 1985-86

PUNJAB-HARYANA PLAINS

Region's Average = -4.42

Source: Abstracts of Punjab and Haryana - 1966 & 1986
Kurukshetra, Rohtak, Jhajjar, Rewari and Faridabad. Here the negative volume of change varied between 5 to 10 per cent. Topographical hindrances in these districts resulted in moderate change of current fallow land during study period.

3. Areas with low volume of negative change (< 3 per cent)

This category was spread in the seventeen districts of the study region and included Nawanshahr, Rupnagar, Ludhiana, Bathinda, Sangrur, Mansa, Panchkula, Ambala, Yamunanagar, Kaithal, Jind, Karnal, Panipat, Sonipat, Bhiwani, Mahendragarh and Gurgaon districts. In these areas due to unfavourable socio-economic, physiographic, and climatic reasons uncultivable land could not be put under cultivation, as a result low volume of negative change in current fallow land was recorded in above mentioned districts.

4. Areas with no change

Only three districts namely, Moga, Muktsar and Faridkot were included in this category of no current fallow land. During these years, there was no current fallow land in these areas because most of the land in above mentioned districts was under barren land, because the maximum area was covered by infertile sandy soils.

Changes in Net Sown Area (Fig. 4.12)

Net sown area had changed significantly during 1965-66 to 1985-86. In 1965-66 it was 76.19 per cent and in 1985-86 it increased to 83.77 per cent. This had recorded 7.58 per cent positive volume of change. During this period, study region had experienced radical changes in irrigation, agricultural infrastructure, progress in road transport, use of
Fig. 4.12

PUNJAB-HARYANA PLAINS
Volume of Change in Net Sown Area
1965-66 to 1985-86

Region's Average = 7.58

Source: Abstracts of Punjab and Haryana - 1966 & 1986
recent farm technology, etc. which had led to changes in net sown area. All these changes are mapped in fig. 4.12 which shows three categories of positive volume of change and one category of negative volume of change (table 4.4). These are as follow:

1. **Areas with high positive volume of change (> 10 per cent)**

   Positive volume of change of more than 10 per cent was recorded in Gurdaspur, Amritsar, Firozpur, Sirsa, Kapurthala, S.A.S. Nagar, Fatehgarh Sahib, Patiala, Kurukshetra and Kaithal districts. Gurdaspur and S.A.S. Nagar districts were lying in the piedmont area and also along the rivers Ravi and Satluj respectively. Here, water-logging areas were being reclaimed and brought under net sown area. In other parts, reclamation of cultivable waste land, fallow land and current fallow land led to high positive volume of change in net sown area.

2. **Areas of moderate positive volume of change (5 to 10 per cent)**

   This category was found in two different belts. One belt was lying in hilly and piedmont plains with adjoining parts of Beas and Satluj flood plains. Second belt included the areas of Yamuna river's flood plains. Hoshiarpur, Nawanshahr, Rupnagar, Jalandhar, Tarn Taran and Ludhiana are the districts found in the first belt. The second belt covered the districts of Karnal, Panipat, Sonepat, Rohtak, Jhajjar, Hisar, Fatehabad and Rewari. Due to physical barriers all these areas, had moderate volume of increase in net sown area.

3. **Areas of low positive volume of change (< 5 per cent)**

   The low category of positive volume of change of less than 5 per cent was recorded in 9 districts namely Moga, Sangrur, Mansa, Jind, Panchkula,
Ambala, Yamunanagar, Bhiwani and Faridabad. In all these areas, barren land and fallow land were brought under net sown area with improvement in agricultural infrastructure. Due to these reasons, area under net sown area had recorded low positive volume of change.

4. Areas of high negative volume of change (>1 per cent)

This category had covered only Gurgaon district of the study region urbanization, Industrilisation, development in urban settlements etc. were the main reasons responsible for high negative volume of change.

5. Areas of low negative volume of change (<1 per cent)

This category of negative volume change in net sown area included Faridkot, Muktsar, Bathinda and Mahendragarh districts. Urbanisation and development of infrastructure were the main reasons for negative volume change in net sown area.

Conclusion

To sum up the changes in land use pattern of Punjab-Haryana plains during 1965-66 to 1985-86 had marked significant changes. The forest land had increased from 1.90 per cent in 1965-66 to 3.68 per cent in 1985-86 with a positive volume of change of 1.78 per cent. At the same time, land not available for cultivation had come down from 11.56 per cent to 9.37 per cent and showed a negative volume of change of 2.19 per cent. Cultivable waste land had experienced negative volume of change of 2.74 per cent. It had declined from 3.90 per cent in 1965-66 to 1.16 per cent in 1985-86. While current fallow land had also decreased from 6.44 per cent to 2.02 per cent with a negative volume of change of 4.42 per cent. Outstanding improvement in agricultural infrastructure had witnessed positive change of 7.58 per cent.
under net sown area. It had increased from 76.19 per cent to 83.77 per cent in the study region during study period. It had shown major shifts in the land use of Punjab-Haryana plains that had been changed, which can be attributed partly to physical and socio-economic factors. It also illustrated that there was a significant fall and down in the land use categories. Forest land and Net sown area had experienced overall positive volume of change under their areas, But in some areas negative changes had also recorded in rest of the categories namely cultivable waste land, current fallow land and land not available cultivation.

B. Changes in Land Use Patterns: 1985-86 to 2005-06

From 1985-86 to 2005-06, study area has experienced so many significant changes in land use patterns. During this time period socio-economic development plays very important role in bringing changes in land use patterns. During this period, forest land, cultivable waste land and net sown area have recorded negative volume of change while land not available for cultivation and current fallow land have recorded positive volume of change.

Table 4.5
Changes in Land Use Patterns in Punjab-Haryana Plains: 1985-86 to 2005-06

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Land Use</th>
<th>Per Cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Forest Land</td>
<td>-0.17</td>
</tr>
<tr>
<td>2.</td>
<td>Land not Available for Cultivation</td>
<td>1.58</td>
</tr>
<tr>
<td>3.</td>
<td>Cultivable Waste Land</td>
<td>-0.26</td>
</tr>
<tr>
<td>4.</td>
<td>Current Fallow Land</td>
<td>0.78</td>
</tr>
<tr>
<td>5.</td>
<td>Net Sown Area</td>
<td>-1.93</td>
</tr>
</tbody>
</table>

Changes in Land Use Patterns in Punjab-Haryana Plains: 1985-86 to 2005-06

- Forest Land, -0.17
- Land not Available for Cultivation, 1.58
- Cultivable Waste Land, -0.26
- Current Fallow Land, 0.78
- Net Sown Area, 1.93
Changes in Forest Land (Fig. 4.13)

Forest land recorded over all negative volume of changes of 0.17 per cent in the study period during study time. But its distribution is not uniform which is shown in fig. 4.13 and table 4.6.

1. Areas with high positive volume of change (>1 per cent)

High increase more than 1 per cent is observed in the districts of Gurdaspur, Hoshiarpur, Nawanshahr, Rupnagar, S.A.S. Nagar, Patiala, Jalandhar and Firozpur. Topography in the districts which are lying in hills (Gurdaspur, Nawanshahr, Hoshiarpur, Rupnagar and S.A.S. Nagar) and foot hills is favourable for forestry. Here government policies also encourage the farmers for the plantation of trees to avoid the soil erosion caused by seasonal streams. In Patiala, Jalandhar and Firozpur districts, most of the land is not used for cultivation due to the problem of water-logging and consequently plantation is done in the flood plains of river Satluj, Ghaggar and Beas. Owing to all these reasons, these districts have experienced high positive volume of change during study time.

2. Areas with low positive volume of change (< 1 per cent)

This category covers only four districts of the study region namely Amritsar, Kapurthala, Ludhiana and Bathinda. These areas of the study region have recorded less than 1 per cent of positive volume of change. All these areas have fertile land, flat topography and well developed irrigational facilities. Thus cultivation of crops is more profitable than plantation of trees in this part of the study area.
### Table 4.6

Changes in Land Use Patterns in Punjab - Haryana Plains 1985-86 to 2005-06
Per Cent to Total Reporting Area

<table>
<thead>
<tr>
<th>District</th>
<th>Forest Land</th>
<th>Land Not available for cultivation</th>
<th>Cultivable Waste Land</th>
<th>Current Fallow Land</th>
<th>Net Sown Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gurdaspur</td>
<td>2.28</td>
<td>-9.69</td>
<td>-0.58</td>
<td>0.00</td>
<td>7.99</td>
</tr>
<tr>
<td>Amritsar</td>
<td>0.82</td>
<td>-3.79</td>
<td>-0.57</td>
<td>3.01</td>
<td>0.53</td>
</tr>
<tr>
<td>Tarn Taran</td>
<td>-0.83</td>
<td>-5.01</td>
<td>1.07</td>
<td>1.21</td>
<td>6.49</td>
</tr>
<tr>
<td>Kapurthala</td>
<td>0.10</td>
<td>15.57</td>
<td>-0.39</td>
<td>-0.60</td>
<td>-9.58</td>
</tr>
<tr>
<td>Jalandhar</td>
<td>1.38</td>
<td>-3.04</td>
<td>0.00</td>
<td>-2.35</td>
<td>4.01</td>
</tr>
<tr>
<td>Nawanshahr</td>
<td>11.62</td>
<td>-0.44</td>
<td>1.57</td>
<td>0.36</td>
<td>-13.21</td>
</tr>
<tr>
<td>Hoshiarpur</td>
<td>7.82</td>
<td>-1.16</td>
<td>-1.24</td>
<td>-0.26</td>
<td>-5.16</td>
</tr>
<tr>
<td>Rupnagar</td>
<td>9.35</td>
<td>-0.72</td>
<td>-2.16</td>
<td>-0.72</td>
<td>-5.76</td>
</tr>
<tr>
<td>S.A.S. Nagar</td>
<td>3.60</td>
<td>9.91</td>
<td>-2.70</td>
<td>-0.90</td>
<td>-9.91</td>
</tr>
<tr>
<td>Ludhiana</td>
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<td>5.43</td>
<td>0.00</td>
<td>0.27</td>
<td>-6.25</td>
</tr>
<tr>
<td>Firozpur</td>
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<td>-0.76</td>
<td>-3.42</td>
<td>-3.99</td>
<td>7.03</td>
</tr>
<tr>
<td>Faridkot</td>
<td>-1.56</td>
<td>5.28</td>
<td>0.00</td>
<td>0.00</td>
<td>-3.73</td>
</tr>
<tr>
<td>Muktsar</td>
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<td>0.44</td>
<td>1.89</td>
<td>4.55</td>
<td>-4.74</td>
</tr>
<tr>
<td>Moga</td>
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<td>3.75</td>
<td>0.00</td>
<td>1.35</td>
<td>-4.80</td>
</tr>
<tr>
<td>Bathinda</td>
<td>0.57</td>
<td>1.91</td>
<td>-0.18</td>
<td>0.00</td>
<td>-2.30</td>
</tr>
<tr>
<td>Mansa</td>
<td>-0.22</td>
<td>-1.04</td>
<td>-0.28</td>
<td>3.27</td>
<td>-1.55</td>
</tr>
<tr>
<td>Sangrur</td>
<td>-0.53</td>
<td>2.99</td>
<td>0.20</td>
<td>-1.00</td>
<td>-1.67</td>
</tr>
<tr>
<td>Patiala</td>
<td>1.32</td>
<td>0.30</td>
<td>0.30</td>
<td>0.86</td>
<td>3.94</td>
</tr>
<tr>
<td>Fatehgarh Sahib</td>
<td>-0.56</td>
<td>-2.53</td>
<td>0.00</td>
<td>-0.85</td>
<td>2.78</td>
</tr>
<tr>
<td>Ambala</td>
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<td>-7.53</td>
<td>-0.95</td>
<td>-6.33</td>
<td>24.71</td>
</tr>
<tr>
<td>Panchkula</td>
<td>-6.58</td>
<td>17.60</td>
<td>2.11</td>
<td>8.84</td>
<td>-21.97</td>
</tr>
<tr>
<td>Yamunanagar</td>
<td>-1.45</td>
<td>-0.95</td>
<td>-0.92</td>
<td>-6.15</td>
<td>9.47</td>
</tr>
<tr>
<td>Kurukshetra</td>
<td>-2.51</td>
<td>7.26</td>
<td>-0.80</td>
<td>-0.28</td>
<td>-3.68</td>
</tr>
<tr>
<td>Kaital</td>
<td>-1.55</td>
<td>10.96</td>
<td>-1.04</td>
<td>-0.48</td>
<td>-7.90</td>
</tr>
<tr>
<td>Karnal</td>
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<td>5.27</td>
<td>1.56</td>
<td>3.74</td>
<td>-7.57</td>
</tr>
<tr>
<td>Panipat</td>
<td>-0.89</td>
<td>8.17</td>
<td>2.98</td>
<td>5.89</td>
<td>-15.96</td>
</tr>
<tr>
<td>Sonipat</td>
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<td>6.57</td>
<td>0.94</td>
<td>12.68</td>
<td>-16.90</td>
</tr>
<tr>
<td>Rohtak</td>
<td>-2.08</td>
<td>-3.94</td>
<td>5.01</td>
<td>1.18</td>
<td>-0.16</td>
</tr>
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<td>Jhajjar</td>
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<td>-0.78</td>
<td>4.70</td>
<td>3.33</td>
<td>-5.17</td>
</tr>
<tr>
<td>Faridabad</td>
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<td>4.47</td>
<td>-0.48</td>
<td>6.25</td>
<td>-8.17</td>
</tr>
<tr>
<td>Gurgaon</td>
<td>-1.11</td>
<td>10.19</td>
<td>0.00</td>
<td>7.04</td>
<td>-16.11</td>
</tr>
<tr>
<td>Rewari</td>
<td>-1.17</td>
<td>-0.50</td>
<td>-0.58</td>
<td>0.43</td>
<td>1.82</td>
</tr>
<tr>
<td>Mahendragarh</td>
<td>-1.16</td>
<td>4.65</td>
<td>-0.82</td>
<td>-0.17</td>
<td>-2.49</td>
</tr>
<tr>
<td>Bhiwani</td>
<td>-2.79</td>
<td>1.29</td>
<td>0.00</td>
<td>2.36</td>
<td>-0.86</td>
</tr>
<tr>
<td>Jind</td>
<td>-1.81</td>
<td>4.45</td>
<td>-2.44</td>
<td>-9.58</td>
<td>12.23</td>
</tr>
<tr>
<td>Hisar</td>
<td>-1.30</td>
<td>1.39</td>
<td>0.00</td>
<td>5.65</td>
<td>-5.68</td>
</tr>
<tr>
<td>Fatehabad</td>
<td>-1.36</td>
<td>0.16</td>
<td>0.00</td>
<td>-2.40</td>
<td>3.61</td>
</tr>
<tr>
<td>Sirsa</td>
<td>-1.17</td>
<td>-0.47</td>
<td>-0.47</td>
<td>1.17</td>
<td>0.94</td>
</tr>
<tr>
<td>REGION</td>
<td>-0.17</td>
<td>1.58</td>
<td>-0.26</td>
<td>0.78</td>
<td>-1.93</td>
</tr>
</tbody>
</table>

Fig. 4.14

PUNJAB-HARYANA PLAINS
Volume of Change in Forest Land
1985-86 to 2005-06

3. Areas with high negative volume of change (> 1 per cent)

This category covers large part of the study region including Ambala, Yamunanagar, Panchkula, Kurukshetra, Kaithal, Jind, Karnal, Sonipat, Jhajjar, Faridabad, Gurgaon, Rewari, Mahendragarh, Bhiwani, Rohtak, Hisar, Fatehabad, Sirsa, Muktsar, Moga and Faridkot districts. The forest area in Ambala, Yamunanagar, Panchkula, Faridabad and Gurgaon districts has declined due to the industrialisation, urbanisation and development of infrastructure. While Kurukshetra, Kaithal, Karnal, Sonepat, Jhajjar and Rohtak are districts have developed agricultural infrastructure structure. Bhiwani, Hisar, Sirsa, Rewari, Mahendragarh, Muktsar, Moga and Faridkot districts have rugged topography which is not suitable for plantation of trees. Obviously due to all these reasons, the share of forested area is low in these districts and consequently these areas are having high negative volume of change.

4. Areas with low negative volume of change (<1 per cent)

Tarn Taran, Mansa, Sangrur, Fatehgarh Sahib and Panipat districts fall in this category. All these districts are agriculturally sound districts with favourable topography for crop farming. Thus farming of crops is more beneficial than tree plantation which resulted in low negative volume of change of forests in these districts.

Changes in Land not Available for Cultivation (Fig.4.15)

Land not available for cultivation has experienced positive volume of change in the study region. In 1985-86 land not available for cultivation had recorded 9.37 per cent and during 2005-06 it is 10.95 per cent. A positive volume of change of 1.58 per cent is recorded during the investigation period.
PUNJAB-HARYANA PLAINS
Volume of Change in Land not Available for Cultivation
1985-86 to 2005-06

The results are illustrated in fig. 4.15 and table 4.6 which exhibit the following three categories.

1. **Category of high positive change (>5 per cent)**

   Kapurthala, S.A.S. Nagar, Ludhiana, Faridkot, Panchkula, Kaithal, Kurukshetra, Karnal, Panipat, Sonipat and Gurgaon districts fall in this category. In all these district positive change of over 5 per cent is recorded from 1985-86 to 2005-06. Here industrialisation, urbanisation, development of infrastructure etc. have led to high volume of positive change in land not available for cultivation.

2. **Areas with low positive change (< 5 per cent)**

   This category is well spread all over the study region. It includes major parts of the study region. The districts of Moga, Bathinda, Muktsar, Sangrur, Patiala, Faridabad, Mahendragarh, Bhiwani, Jind, Hisar and Fatehabad form this category. Physical setup of above mentioned districts is a major setback, responsible for low positive change in land not available for cultivation. For example in Hisar, Bhiwani, Mahendragarh, Part of Moga and parts of Bathinda districts, most of the area is under sandy and sandy loam soils. Due to this reason, lots of difficulties come in the way of development works. In other districts, lack of urban centers and industrial centers are the main factors for low positive volume of change in land not available for cultivation.

3. **Areas with high negative change (> 5 per cent)**

   This category of high negative volume of change covers the districts of Gurdaspur, Tarn Taran and Ambala. Gurdaspur and Ambala districts are found in the foot hill zone of Shiwaliks. Here decline in land not available for cultivation is due to physiography of these districts. Because of hilly areas,
these districts have lot of problems which are responsible for high negative change. In Tarn Taran, decline in land not available for cultivation is due to the land cover by flood plains.

4. Areas with moderate negative change (1-5 per cent)

This category of moderate negative volume of change in land not available for cultivation comprises Amritsar, Jalandhar, Hoshiarpur, Mansa, Fatehgarh Sahib and Rohtak districts. Volume of change in these districts ranges between 1 to 5 per cent. Decline in land not available for cultivation in Amritsar, Jalandhar, Fatehgarh Sahib and Rohtak districts is because of most of the land in these districts is under farming owing to agricultural development. Most of the land is declared as forest land and barren land in Hoshiarpur and Mansa districts respectively. All these reasons are responsible for moderate extent of land not available for cultivation.

5. Areas with low negative change (< 1 per cent)

Rests of the districts are covered by this category. It includes Nawanshahr, Rupnagar, Firozpur, Yamunanagar, Jhajjar, Rewari and Sirsa districts. Sandy soil which covers Sirsa, Rewari, Part of Firozpur and Jhajjar districts is the main barrier in developmental work. Whereas in Nawanshahr, Rupnagar and Yamunanagar districts, most of the land is under hills and foot hill zone of Shiwalik. But during this time period, Government has introduced many policies regarding afforestation of land. Thus tree plantation is done on the land which is not suitable for cultivation and consequently it leads to low magnitude of land not available for cultivation in these districts.
Changes in Cultivable Waste Land (Fig. 4.16)

-0.26 per cent volume of change is recorded in cultivable waste land during the study period. At the same time, some districts of the study region have experienced increase whereas some have experienced decline in cultivable waste land. So to know the spatial variation regarding this category derived results are shown in fig. 4.16 and table 4.6 which depict following five categories:

1. Areas with high positive change (>1 per cent)

Different patches are found regarding this category of high positive change of cultivable waste land in the study region. It includes eight districts namely Tarn Taran, Muktsar, Nawanshahr, Panchkula, Karnal, Panipat, Rohtak and Jhajjar. In these districts, land is not reclaimed due to the physical problems. Karnal, Panipat, Rohtak, Jhajjar and Tarn Taran districts have water-logging problem, whereas Balachaur tehsil of Nawanshahr district and Panchkula district are having undulating and dissected topography which is again a big problem in reclamation of land. Owing to all these reasons, high positive volume change is recorded in these districts of the study region.

2. Areas with low positive change (<1 per cent)

This category covers the central and eastern parts of the study region. It includes Sonipat, Patiala and Sangrur. Here cultivable waste land is below 1 per cent because in 1985-86 and 2005-06, this category occupied a very small area which is less than 500 hectares in these districts and it resulted into low positive volume of change during the investigation period.
Fig. 4.16

PUNJAB-HARYANA PLAINS
Volume of Change in Cultivable Waste Land
1985-86 to 2005-06

3. Areas with high negative volume change (>1 per cent)

This category of high negative volume of change covers Hoshiarpur, Rupnagar, S.A.S. Nagar, Firozpur, Kaithal and Jind districts of the study region during 1985-86 to 2005-06. During this time period most of the land put under cultivation of crops with the innovation of farm techniques which result in high negative volume change in cultivable waste land in Hoshiarpur, Rupnagar and S.A.S. Nagar. In other districts, reclamation of water-logging area are responsible for bringing more area under cultivation. All this has resulted into high negative volume of change in cultivable waste land.

4. Areas with low negative change (<1 per cent)

The districts falling in this category of low negative volume of change have recorded less than 1.00 per cent Volume of change. These districts are Gurdaspur, Amritsar, Kapurthala, Bathinda, Mansa, Ambala, Yamunanagar, Kurukshetra, Faridabad, Rewari, Mahendragarh and Sirsa. In Ambala, Yamunanagar and Faridabad, area under cultivation is very less because of industrial development, urban centers, and settlements, rural as well as urban. Because of these reasons, a decline in cultivable waste land is noted. In Mahendragarh, Rewari, Bathinda, Mansa and Gurdaspur districts, physiography plays an important role. Due to rough and hilly topography, most of the land is put under tree plantation and as a result, these districts have recorded low negative volume of change. Rest of the districts are facing problem of water logging which is again creating a problem for reclamation of land.
5. Areas with no change

This category includes Ludhiana, Faridkot, Moga, Fatehgarh Sahib, Faridkot, Jalandhar, Gurgaon, Bhiwani, Hisar and Fatehabad districts. In the districts of Ludhiana, Moga, Fatehgarh Sahib and Jalandhar are having flat land and well developed agriculture. Owing to all these reasons, every inch of potential land is put under cultivation and in case of Gurgaon, Bhiwani and Fatehabad during 1965-66 to 1985-86, the reclamation of cultivable waste land was done and there was no land under this category in 1985-86 as well as 2005-06 there for knows change in cultivable waste land is noted.

Changes in Current Fallow Land (Fig. 4.17)

During this time period, current fallow has experienced a positive volume of change of 0.78 per cent in the study region. In 1985-86 current fallow land covered 2.02 per cent and in 2005-06, it is 2.80 per cent which shows an increase of 0.78 per cent in the study area. The spatial changes are shown in of fig. 4.17 and table 4.6 which depict five categories.

1. Areas of high positive volume of change (> 2 per cent)

This category of high positive change comprises the districts of Amritsar, Muktsar, Mansa, Panchkula, Karnal, Panipat, Sonipat, Jhajjar, Faridabad, Gurgaon, Bhiwani and Hisar. There are so many reasons for a positive growth of current fallow land in these districts of the study region. In Bhiwani and Hisar districts the roughness of relief is a key factor responsible for high change in current fallow land during 1985-86 to 2005-06. Whereas in Gurgaon, Faridabad and Panchkula districts industrial development is recorded during this period. Rest of the districts are facing water logging problem which creates a major problem in reclamation of land. All these

**Source:** Abstracts of Punjab and Haryana - 1986 & 2006
reasons are mainly responsible for the high positive change of current fallow land in these districts.

2. Areas with Low Positive Volume of Change (< 2 per cent)

Tarn Taran, Nawanshahr, Ludhiana, Moga, Patiala, Rohtak, Rewari and Sirsa are the districts which fall in this category of low positive volume of change in current fallow land. Here proportion varies between .27 per cent in Ludhiana district and 1.3 per cent Moga district.

3. Areas with high negative volume of Change (> 2 per cent)

This category of high negative volume of change includes Jalandhar, Firozpur, Ambala, Yamunanagar, Jind and Fatehabad districts of the study Region. In these districts decline in the share of current fallow land is due to the progressive action taken by the government policies to make highest utilization of land under farming. Government introduced many incentives for the farmers such as, agriculture loan on very low interest rate, provide high yielding variety of seeds on subsidize rate etc. Apart from this reclamation work, use of agricultural equipments etc. brought most of the fallow land under crops.

4. Areas with low Negative Volume of Change (<2 per cent)

Low decline of fallow land has been noticed in rest of the study region. It includes Kapurthala, Rupnagar, Hoshiarpur, S.A.S. Nagar, Sangrur, Fatehgarh Sahib, Kurukshtra, Kaithal and Mahendragarh. Topography plays a very important role in the districts of Kapurthala, Rupnagar, Hoshiarpur, S.A.S. Nagar and Mahendragarh. It is difficult to sow the whole cultivated. In the remaining districts, the current fallow land was already noted low per cent in 1985-86 which leads to negative volume of change.
5. Areas with no change

Gurdaspur, Faridkot and Bathinda are the districts form this category of no change in current fallow land during 1985-86 to 2005-06.

Changes in Net Sown Area (Fig. 4.18)

During 1985-86 to 2005-06, study region has experienced negative volume of change in net sown area. In 1985-86 net sown area covered 83.77 per cent of the total reporting area and during 2005-06 it occupies 81.84 per cent area and in this way register a negative volume of change of 1.93 per cent. Fig. 4.18 and table 4.6 exhibit the following five categories:

1. Areas with high positive volume of change (>10 per cent)

Positive volume of change more than 10 per cent is recorded in only two districts of the study area namely Ambala and Jind. In these districts, more area is brought under net sown area by reclamation of land. In piedmont region of Ambala, land is put under cultivation. In Jind district, cultivable waste land and fallow land are reclaimed, which is responsible for high positive change in net sown area.

2. Areas with moderate positive volume of change (5-10 per cent)

Moderate positive volume of change includes Gurdaspur, Tarn Taran, Firozpur and Yamunanagar districts. Due to the implementation of Green Revolution technology, use of new farm techniques, use of HYV's of seeds, chemical fertilizers etc. the net sown area has increased. Apart from this reclamation of water logged areas is also helpful for the increase of net sown area which has led to moderate change in net sown area.
PUNJAB-HARYANA PLAINS
Volume of Change in Net Sown Area
1985-86 to 2005-06

Per Cent

> 10
5-10
> 5
< 5
+ ve - ve

Region's Average = -1.92

3. Areas with low positive volume of change (<5 per cent)

This category covers Amritsar, Jalandhar, Fatehgarh Sahib, Rewari, Fatehabad and Sirsa districts. All these areas (except Rewari) had high proportion of net sown area during 1985-86 due to advancement in agriculture. But in 2005-06 owing to more land coming under non-agricultural uses and the less area brought under net sown area through reclamation, etc. All this is responsible for low positive volume of change in net sown area.

4. Area with high negative volume of change (>5 per cent)

Kapurthala, Nawanshahr, Hoshiarpur, Rupnagar, S.A.S. Nagar, Ludhiana, Kaithal, Karnal, Panipat, Panchkula, Sonipat, Jhajjar, Faridabad, Gurgaon and Hisar are the districts which fall in this category. Here the high negative change of above 5 per cent is recorded. In all these districts, the development work like construction of road, canal, industries and growth of urban centers, have taken place and as a result, the land acquired for above mentioned socio-economic purposes snatched land from net sown area significantly which consequently lead to high negative volume of change in net sown area.

5. Areas with low negative volume of change (<5 per cent)

The rest of the districts form this category of low negative volume of change. These are Faridkot, Muktsar, Moga, Bathinda, Mansa, Sangrur, Patiala, Kurukshetra, Rohtak, Mahendragarh and Bhiwani districts. Increase in area under settlement, rural as well as urban, and expansion of infrastructure in these areas resulted into decline in the proportion of net sown area in 2005-06 as compared to 1985-86 and ultimately resulted into low negative volume of change in net sown area.
Conclusion

It is observed that during 1985-86 to 2005-06, the study region has experienced drastic changes in land use pattern. Forest land covered 3.68 per cent of total reporting area in 1985-86 and 3.51 per cent of total reporting area in 2005-06 which shows a negative change of -0.17 per cent during study period. Land not available for cultivation has experienced a positive volume of change of 1.58 per cent from 1985-86 to 2005-06 with 9.37 per cent and 10.95 per cent of area respectively. At the same time, cultivable waste land has experienced negative volume of change of 0.26 in study area during time span of 20 years because of the reclamation works. Current fallow land registered 0.78 per cent of positive change with 2.02 per cent area in 185-86 and 2.80 per cent of area in 2005-06. Lastly, net sown area shows a negative volume of change of 1.92 per cent from 1985-86 to 2005-06. It shows that positive volume change is recorded in land not available for cultivation and current fallow land while negative volume of change is recorded in the categories of forest land, cultivable waste land and net sown area.

C. Changes in Land Use Patterns: 1965-66 to 2005-06

From 1965-66 to 2005-06, the land use pattern in the study region has changed very significantly. During this time period, forest land has experienced positive volume of change, because of government policies for plantation in the hilly areas. Both cultivable waste land and current fallow land also have declined because of reclamation work, agricultural advancement and development of infrastructure. Due to all this, net sown area has also recorded positive volume of change.
Table 4.7
Changes in Land Use Patterns in Punjab-Haryana Plains: 1965-66 to 2005-06

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Land Use</th>
<th>Per Cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Forest Land</td>
<td>1.61</td>
</tr>
<tr>
<td>2.</td>
<td>Land not Available for Cultivation</td>
<td>-0.61</td>
</tr>
<tr>
<td>3.</td>
<td>Cultivable Waste Land</td>
<td>-3.00</td>
</tr>
<tr>
<td>4.</td>
<td>Current Fallow Land</td>
<td>-3.64</td>
</tr>
<tr>
<td>5.</td>
<td>Net Sown Area</td>
<td>5.66</td>
</tr>
</tbody>
</table>


Changes in Forest Land (Fig. 4.20)

The study region has experienced overall positive volume of change of 1.61 per cent in forest land during the investigation period. Some areas have recorded positive volume of change, while others have recorded negative volume of change. The results are shown in Fig. 4.20 and table 4.8 which portrays the following categories:

1. Areas with high positive volume of change (>1 per cent)

   This category includes the districts of Gurdaspur, Amritsar, Jalandhar, Nawanshahr, Hoshiarpur, Rupnagar, S.A.S. Nagar, Ludhiana, Bathinda, Sangrur, Patiala, Panipat and Gurgaon. This significant increase in forest land during 1965-66 to 2005-06 is due to the afforestation work of the Forest Department.

2. Areas with low positive volume of change (<1 per cent)

   This category covers Tarn Taran, Kapurthala, Firozpur, Moga, Mansa, Kaithal and Mahendragarh districts of the study region. There is waterlogging problem mostly in the Tarn Taran, Kapurthala and Kaithal districts is not suitable for cultivation thus plantation is done in these districts.
Changes in Land Use Patterns in Punjab-Haryana Plains: 1965-66 to 2005-06

- Net Sown Area: 5.66
- Current Fallow Land: -3.64
- Cultivable Waste Land: -3
- Land not Available for Cultivation: -0.61
- Forest Land: 1.61

Fig. 4.19
Table 4.8
Changes in Land Use Patterns in Punjab - Haryana Plains 1965-66 to 2005-06
Per Cent to Total Reporting Area

<table>
<thead>
<tr>
<th>District</th>
<th>Forest Land</th>
<th>Land Not available for cultivation</th>
<th>Cultivable Waste Land</th>
<th>Current Fallow Land</th>
<th>Net Sown Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amritsar</td>
<td>2.03</td>
<td>-4.28</td>
<td>-11.02</td>
<td>-4.46</td>
<td>17.74</td>
</tr>
<tr>
<td>Tarn Taran</td>
<td>0.07</td>
<td>-2.53</td>
<td>-5.01</td>
<td>-2.34</td>
<td>12.67</td>
</tr>
<tr>
<td>Kapurthala</td>
<td>0.60</td>
<td>-2.40</td>
<td>-0.60</td>
<td>-3.83</td>
<td>6.23</td>
</tr>
<tr>
<td>Jalandhar</td>
<td>1.39</td>
<td>-8.86</td>
<td>0.00</td>
<td>-5.75</td>
<td>13.21</td>
</tr>
<tr>
<td>Nawal Shahr</td>
<td>11.69</td>
<td>-6.71</td>
<td>1.57</td>
<td>0.59</td>
<td>0.05</td>
</tr>
<tr>
<td>Hoshiarpur</td>
<td>30.60</td>
<td>-25.54</td>
<td>-2.99</td>
<td>-4.55</td>
<td>2.47</td>
</tr>
<tr>
<td>Rupnagar</td>
<td>21.81</td>
<td>-13.98</td>
<td>-5.29</td>
<td>-2.41</td>
<td>-0.13</td>
</tr>
<tr>
<td>S.A.S. Nagar</td>
<td>11.98</td>
<td>-9.27</td>
<td>-5.87</td>
<td>-5.38</td>
<td>8.55</td>
</tr>
<tr>
<td>Ludhiana</td>
<td>1.65</td>
<td>4.00</td>
<td>-5.33</td>
<td>-2.13</td>
<td>1.81</td>
</tr>
<tr>
<td>Firozpur</td>
<td>0.89</td>
<td>-0.38</td>
<td>-6.93</td>
<td>-16.79</td>
<td>23.22</td>
</tr>
<tr>
<td>Faridkot</td>
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<td>7.43</td>
<td>0.00</td>
<td>0.00</td>
<td>-3.96</td>
</tr>
<tr>
<td>Muktsar</td>
<td>-1.01</td>
<td>-0.51</td>
<td>1.89</td>
<td>4.55</td>
<td>-4.92</td>
</tr>
<tr>
<td>Moga</td>
<td>0.15</td>
<td>3.17</td>
<td>0.00</td>
<td>1.35</td>
<td>-4.67</td>
</tr>
<tr>
<td>Bathinda</td>
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<td>4.70</td>
<td>-0.55</td>
<td>-2.58</td>
<td>-3.01</td>
</tr>
<tr>
<td>Mansa</td>
<td>0.93</td>
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<td>0.00</td>
<td>0.51</td>
<td>-1.08</td>
</tr>
<tr>
<td>Sangrur</td>
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<td>-2.70</td>
<td>-2.70</td>
<td>1.52</td>
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<td>Patiala</td>
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<td>-2.07</td>
<td>-14.66</td>
<td>12.57</td>
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<tr>
<td>Fatehgarh Sahib</td>
<td>-0.07</td>
<td>0.12</td>
<td>-2.37</td>
<td>-14.08</td>
<td>16.41</td>
</tr>
<tr>
<td>Ambala</td>
<td>-11.62</td>
<td>-5.91</td>
<td>-4.15</td>
<td>-5.87</td>
<td>27.55</td>
</tr>
<tr>
<td>Panchkula</td>
<td>-9.85</td>
<td>21.25</td>
<td>-1.89</td>
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<td>-19.64</td>
</tr>
<tr>
<td>Yamunanagar</td>
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<td>-4.07</td>
<td>-5.20</td>
<td>10.73</td>
</tr>
<tr>
<td>Kurukshetra</td>
<td>-1.55</td>
<td>-5.45</td>
<td>-7.91</td>
<td>-3.71</td>
<td>18.61</td>
</tr>
<tr>
<td>Kaithal</td>
<td>0.22</td>
<td>2.70</td>
<td>-4.74</td>
<td>-2.26</td>
<td>4.08</td>
</tr>
<tr>
<td>Karnal</td>
<td>-0.84</td>
<td>0.99</td>
<td>-3.21</td>
<td>1.07</td>
<td>1.99</td>
</tr>
<tr>
<td>Panipat</td>
<td>1.16</td>
<td>3.46</td>
<td>-1.02</td>
<td>3.55</td>
<td>-7.16</td>
</tr>
<tr>
<td>Sonipat</td>
<td>-0.78</td>
<td>1.70</td>
<td>-2.39</td>
<td>11.93</td>
<td>-10.46</td>
</tr>
<tr>
<td>Rohtak</td>
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<td>-2.14</td>
<td>6.72</td>
</tr>
<tr>
<td>Jhajjar</td>
<td>-1.59</td>
<td>-1.81</td>
<td>2.00</td>
<td>-0.38</td>
<td>1.78</td>
</tr>
<tr>
<td>Faridabad</td>
<td>-0.84</td>
<td>11.17</td>
<td>-5.59</td>
<td>1.41</td>
<td>-6.15</td>
</tr>
<tr>
<td>Gurgaon</td>
<td>1.55</td>
<td>16.38</td>
<td>-0.37</td>
<td>5.24</td>
<td>-22.79</td>
</tr>
<tr>
<td>Rewari</td>
<td>-0.97</td>
<td>-3.46</td>
<td>-1.14</td>
<td>-3.91</td>
<td>9.47</td>
</tr>
<tr>
<td>Mahendragarh</td>
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<td>8.48</td>
<td>-5.28</td>
<td>0.10</td>
<td>-3.45</td>
</tr>
<tr>
<td>Bhiwani</td>
<td>-0.23</td>
<td>1.28</td>
<td>-5.90</td>
<td>3.55</td>
<td>1.29</td>
</tr>
<tr>
<td>Jind</td>
<td>-0.83</td>
<td>-1.30</td>
<td>-1.90</td>
<td>-8.36</td>
<td>12.39</td>
</tr>
<tr>
<td>Hisar</td>
<td>-1.72</td>
<td>4.00</td>
<td>-3.37</td>
<td>-1.59</td>
<td>2.68</td>
</tr>
<tr>
<td>Fatehabad</td>
<td>-1.52</td>
<td>3.67</td>
<td>-3.18</td>
<td>-8.68</td>
<td>9.72</td>
</tr>
<tr>
<td>Sirsa</td>
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<td>-1.04</td>
<td>-3.20</td>
<td>-10.82</td>
<td>16.48</td>
</tr>
<tr>
<td>REGION</td>
<td>1.61</td>
<td>-0.61</td>
<td>-3.00</td>
<td>-3.64</td>
<td>5.66</td>
</tr>
</tbody>
</table>


Fig. 4.20

PUNJAB-HARYANA PLAINS
Volume of Change in Forest Land
1965-66 to 2005-06

3. Areas with high negative volume of change (>1 per cent)

This category has two belts. One belt runs along Shiwaliks and comprises Ambala, Panchkula, Yamunanagar and Kurukshetra districts. The second belt contains Faridkot, Muktsar, Hisar, Fatehabad, Sirsa, Rohtak and Jhajjar districts. Due to the industrial development, constructional work road widening etc. in Ambala, Panchkula, Kurukshetra and Yamunanagar districts, most of the forested area is deforested and that land is used for development work which is the main reason responsible for a sizeable decrease in forest land. While in other districts reclamation work is responsible for decrease in area regarding forest land.

4. Areas with low negative volume of change (<1 per cent)

Negative change of less than 1 per cent is found in rest of the study region. This category includes Fatehgarh Sahib, Karnal, Faridabad, Sonepat, Rewari, Bhiwani and Jind districts. In these districts, forested area is declined during the investigation period because of the increase in area under settlements, roads, railway lines, urban centers, etc.

Changes in Land not Available for Cultivation (Fig. 4.21)

The study region has recorded negative volume of change of 0.61 per cent in land not available for cultivation. During 2005-06, this category occupies 10.95 per cent area and in 1965-66 it had occupied 11.56 per cent area. The analyses of fig. 4.21 and table 4.8 depict the following categories:

1. Areas with high positive volume of change (>5 per cent)

High increase, in land not available for cultivation has been recorded, in Faridkot, Panchkula, Faridabad, Gurgaon and Mahendragarh districts. Industrial development in Panchkula, Faridabad and Gurgaon is the most
Volume of Change in Land not Available for Cultivation
1965-66 to 2005-06

important reason responsible for high share of land not available for
cultivation. Expansion of both rural and urban settlements and transport
network during 2005-06 in Faridkot and Mahendragarh districts are
responsible for high share of land not available for cultivation.

2. Areas with low positive volume of change (<5 per cent)

Category of low positive change has been found in Ludhiana, Moga,
Bathinda, Sangrur, Patiala, Fatehgarh Sahib, Yamunanagar, Kaithal, Karnal,
Panipat, Sonepat, Bhiwani, Hisar and Fatehabad districts. This category
covers a large part of the study region. These are agriculturally developed
districts. Here industrial growth is low, which is the major reason for low
positive volume of change in land not available for cultivation.

3. Areas with high negative volume of change (>5 per cent)

Out of 38 districts, 8 districts are covered by this category namely
Gurdaspur, Jalandhar, Nawanshahr, Hoshiarpur, Rupnagar, S.A.S. Nagar,
Ambala and Kurukshetra. In the districts of Gurdaspur, Nawanshahr,
Hoshiarpur, Rupnagar and S.A.S. Nagar district most of the land was under
unchecked growth of trees cover during 60's. Secondly, these areas have hills
and undulating & dissected topography which are being levelled and brought
under cultivation and consequently this process has led to significant decline
in land not available for cultivation.

4. Area with moderate negative volume of change (1-5 per cent)

Category of moderate change includes Amritsar, Tarn Taran
Kapurthala, Rohtak, Jhajjar, Jind, Rewari and Sirsa districts. In these districts,
volume of change ranges from 1 to 5 per cent. Decline in land not available
for cultivation in these districts is due to less number of urban centers,
settlement area, etc. with the exception of Amritsar, where the land under this category in 1965-66 was low.

5. Areas with low negative volume of change (<1 per cent)

The rest of the districts in the study area are included in the category of low negative volume of change in land not available for cultivation. These are Firozpur, Muktsar and Mansa districts. Land under this category was very low during 1965-66. Hardly any industrial development has taken place in these districts during 1965-66 to 2005-06 and moreover, urban centers are also very meager. So, all these reasons are responsible for low negative volume of change in land not available for cultivation.

Changes in Cultivable Waste Land (Fig. 4.22)

Cultivable waste land has experienced negative volume of change in overall land use pattern during 1965-66 to 2005-06. Negative change of 3 per cent is recorded from 1965-66 to 2005-06. But this change is uneven in its spatial distribution. These changes are discussed with the help of Fig. 4.22 and Table 4.8 which depict the following categories:

1. Areas with positive volume of change (>1 per cent)

This category covers Nawanshahr, Muktsar, Rohtak and Jhajjar districts. Some topographical problems such as hills in Nawanshahr, water-logging in Muktsar and presence of hard rock in Jhajjar, etc. were responsible for high positive volume of change.

2. Area with high negative volume of change (>4 per cent)

This category mainly includes Amritsar, Tarn Taran, Rupnagar, S.A.S. Nagar, Ludhiana, Firozpur, Ambala, Yamunanagar, Kurukshtera, Kaithal, Faridabad, Mahendragarh and Bhiwani districts. Reclamation of the lands is
Fig. 4.22

PUNJAB-HARYANA PLAINS
Volume of Change in Cultivable Waste Land
1965-66 to 2005-06


the main reason responsible for high volume of negative change in cultivable waste land.

3. Area with low negative volume of change (<4 per cent)

Gurdaspur, Hoshiarpur, Kapurthala, Bathinda, Sangrur, Patiala, Fatehgarh Sahib, Karnal, Sonipat, Hisar, Fatehabad, Sirsa, Panchkula, Panipat, Jind, Rewari and Gurgaon districts are included in this category of low negative change. These areas have recorded low decline in the amount of cultivable waste land because above mentioned districts have low share of their area under cultivable waste land in 2005-06.

4. Area with no change

Only four districts of the study region are included in this category namely, Jalandhar, Faridkot, Moga and Mansa. These are the districts having no area under cultivable waste land during 1965-66 to 2005-06.

Changes in Current Fallow Land (Fig. 4.23)

The study area had 6.44 per cent current fallow land during 1965-66 which has declined to 2.80 per cent in 2005-06 and registered a negative volume of change -3.64 per cent. But some areas have experienced positive changes while others have negative changes. These changes are shown in fig. 4.23 and Table 4.8 which shows the following categories.

1. Areas with High Positive Volume of Change (>2 per cent)

Muktsar, Panchkula, Panipat, Sonipat, Gurgaon and Bhiwani districts fall in the category of high positive volume of change. Due to certain socio-economic reasons and topographic problems these areas have high positive volume of change in current fallow land.

Fig. 4.23

PUNJAB-HARYANA PLAINS
Volume of Change in Current Fallow Land
1965-66 to 2005-06

Region’s Average = -3.64

2. Areas with low positive volume of change (<2 per cent)

Category of low positive volume of change covers Nawanshahr, Moga, Mansa, Karnal, Faridabad and Mahendragarh districts. The problem of waterlogging in flood plain areas of Karnal, Faridabad and Mansa districts are responsible for low positive volume of change. But in Nawanshahr, Moga and Mahendragarh districts soil erosion, difficult topography, etc., are the main reasons for low positive volume of change.

3. Areas with high negative volume of change (>2 per cent)

This category contains large parts of the study region including the districts of Gurdaspur, Amritsar, Tarn Taran, Kapurthala, Jalandhar, Hoshiarpur, Rupnagar, S.A.S. Nagar, Ludhiana, Firozpur, Bathinda, Sangrur, Patiala, Fatehgarh Sahib, Ambala, Kurukshtra, Sirsa, Kapurthala, Kaithal, Rohtak, Rewari, Jind and Fatehabad. Government’s favourable policy for agriculture and mechanization of agriculture are largely responsible for decline in current fallow land.

4. Areas with low negative volume of change (>2 per cent)

Only two districts namely Hisar and Jhajjar includes in the category of low negative volume of change in current fallow land. With the ushering of green revolution technology, development in agricultural infrastructure, expansion in irrigational facilities, are the factors responsible for low negative volume of change in above mentioned districts.

5. Areas with no change

Faridkot is the only district to fall in this category where no change in current fallow is taken place. It is also worth mentioning that no area is
recorded in area under fallow in 1965-66 as well as in 2005-06 which led to no change in current fallow land.

Changes in Net Sown Area (Fig. 4.24)

The net sown area has registered a positive volume of change of 5.66 per cent in the study region during 1965-66 to 2005-06 periods. The main reasons responsible for change in net sown area are population growth, expansion of irrigation, development of agricultural infrastructure, progress in methods of farming, etc. while negative change is the result of expansion of industries, urban centers, etc. All these changes are discussed as under with fig 4.24 and Table 4.8.

1. Areas with high positive volume of change (>10 per cent)

High positive volume of change in net sown area forms two belts. One belt contains Gurdaspur, Amritsar, Tarn Taran, Jalandhar, Firozpur and Sirsa districts. And second belt comprises of Fatehgarh Sahib, Patiala, Jind, Kurukshetra, Ambala and Yamunanagar districts. The area lying along the river Ravi which was waterlogged has been reclaimed and brought under net sown area and is responsible for high positive volume of change, while the areas lying in piedmont plains such as part of Gurdaspur, Ambala and Yamunanagar are leveled by the farmers and most of this land is put under net sown area.

2. Areas with moderate positive volume of change (5-10 per cent)

This category of moderate positive volume of change is recorded in the districts of Kapurthala, S.A.S. Nagar, Rohtak, Rewari and Fatehabad. Moderate change in net sown area is the result of reclamation of water logged areas and levelling of sand dunes and undulating topography.
Fig. 4.24

PUNJAB-HARYANA PLAINS
Volume of Change in Net Sown Area
1965-66 to 2005-06

Region's Average = 5.66

3. Areas with low positive volume of change (<5 per cent)

The category of low positive volume of change contains Hoshiarpur, Nawanshahr, Ludhiana, Sangrur, Karnal, Kaithal, Jhajjar, Bhiwani and Hisar districts. With the use of new farm techniques, most of the land in these areas is brought under net sown area which resulted to low positive volume of change.

4. Areas with high negative volume of change (>5 per cent)

The category of high negative volume of change has 5 districts of the study area. In these districts negative volume of change is above 5 per cent. These districts are Panchkula, Panipat, Sonipat, Faridabad and Gurgaon. Developmental works and industrialization are key factors for the decline of net sown area in Faridabad, Gurgaon and Panchkula districts. In Panipat and Sonipat districts, expansion of settlements, urbanizations, industrialization, etc. are responsible for high negative volume of change.

5. Areas with low negative volume of change (<5 per cent)

It includes the western and northeastern parts of the study region and includes Rupnagar, Faridkot, Muktsar, Moga, Bathinda, Mansa, and Mahendragarh districts. In these districts, net sown area has declined during 2005-06 because of urbanization, development works, road network, etc. Thus net sown area has experienced low negative volume of change during the investigation period.

Conclusion

The given land use pattern in Punjab-Haryana Plains in 1965-66 demonstrate that forest land occupied 1.90 per cent of the total reporting area and in 2005-06, it occupies 3.51 per cent area. These figures gained a positive volume of change of 1.61 per cent in forest land from 1965-66 to
2005-06. Whereas, land not available for cultivation, shows a negative volume of change of 0.62 per cent. It had 11.56 per cent area in 1965-66 and 10.95 per cent area in 2005-06 of the total reporting area. At the same time, cultivable waste land has experienced a negative volume of change of 3.00 per cent which is the result of reclamation work. Current fallow land is recorded negative volume of change of 3.64 per cent. Whereas net sown area had registered 76.19 per cent area of total reporting area during 1965-66 and 81.84 per cent area during 2005-06. It shows that positive volume of change of 5.66 percent is recorded in of net sown area. All this shows that positive volume of change is recorded in respect of two categories of land use pattern that is forest land and net sown area, whereas negative volume of change is recorded in other three categories of land use pattern. These are land not available for cultivation, cultivable waste land and current fallow land. After making explanation of the land use patterns and changes therein it becomes judicious to discuss the cropping pattern and changes therein the proceeding chapter.

**Conclusion of the Chapter**

Land use pattern and changes therein are discussed in this chapter which shows that in 2005-06, area under forest land is 3.51 per cent of total cropped area while land not available for cultivation comprises 10.59 per cent, area under cultivable waste land is 0.90 per cent. Whereas current fallow land has 2.80 per cent and the net sown area contains 81.84 per cent of total reporting area. It shows that there is little scope for further increase in net sown area. Area under forestland was 1.90 per cent in 1965-66, which had increased to 3.68 per cent in 1985-86 and further it decreases to 3.51 per cent.
in 2005-06. Land not available for cultivation had 11.56 per cent of the total reporting area in 1965-66. It has declined to 9.35 per cent in 1985-86 and has increased to 10.95 per cent in 2005-06. Cultivable wasteland had experienced decline. It was noted 3.90 per cent, 1.16 per cent and 0.90 per cent in 1965-66, 1985-86 and 2005-06 respectively. A fluctuating trend in current fallow is noted. It was recorded 6.44 per cent in 1965-66, 2.02 per cent in 1985-86 and 2.80 per cent in 2005-06. However, overall decline of 3.64 per cent is noted in current fallow. Net sown area has increased from 76.19 per cent in 1965-66 to 83.77 per cent in 1985-86 and it declines to 81.84 per cent in 2005-06. Above facts show that the forestland and net sown area have recorded positive volume of change during 1965-66 to 2005-06 whereas during this period, the land not available for cultivation, cultivable wasteland and current fallow land have recorded negative volume of change. All this have been happened due to the introduction of green revolution technology.