Chapter 4
LANDUSE

4-A: GENERAL LANDUSE
4-A.1: INTRODUCTION

The fundamental utility of land is satisfying the human need of food habitation and housing materials. It is essential to choose proper mode of landuse planning and allocation to various ingredients of optimum landuse to meet/solve the human needs. Kellong (1980) has rightly pointed out that this calls for the clear understanding of land classification for successful planning and development. The application of various inputs in land may change the allocation of land to different uses. The factors, conservation and quality of our socio-economic environments are most fundamental for the proper use of our land. This statement is true not only of large urban centers as well as most of the remote areas. The growing pressure of population coupled with an increasing variety of demand on land resources has brought extra pressure on available resources. In order to deal with these and to plan for optimum utilization of land, it is necessary to have accurate and up to date information in all possible details on landuse. It is therefore, the study of classification of landuse pattern in Nashik district would be helpful for preparation of the relative development plan for the district.

The objective of this chapter is to assess spatial as well as temporal landuse and suggest possible Solutions to improve existing landuse in the district in the light of physico-socio-economic conditions.

The area of forest cover (FC), net sown area (NSA) area not available for cultivation (ANC), Fallow Land (FL) and cultivable waste (CW) have been converted into percentage to
total geographical area. Further, these have been used for showing the spatial distribution of land classification with suitable cartographic maps. A line graph Exhibits the temporal variation of land classification for a period of forty years (1960-61 to 2000-01) in the district. The description of each land classification has been supplemented by numerous spot-inquries, besides information embodied by using the relative District Census Handbook, District Gazetteer and District socio economic Review of Nashik District.

4-A.2: CLASSIFICATION OF LAND

The aim of the classification of land is to divide land into different categories according to single factor or set of factors. Therefore, classification of land may be different types and depending on the factors taken into consideration. The classification of land has a direct bearing on climatic factors, Soil characteristics, and slope of land, degree of erosion, water supply, drainage and similar environmental conditions. The landuse capabilities, classification portrays, physical capability of land to produce over a long period of time for selected uses, which can be provide land operation with a basis for actual practice of land (Stamp, 1968).

In the recent years several attempts have been made in different countries of world to classify landuses from different points of views and for different purposes, employing varieties of methods. A stamp (1960) has cogently remarked that it is not surprising that the divergence points of view on classification of land prevail. He is well regarded as pioneer in the field of land classification. His example initiated further studies in this direction. In his work entitled “The land of Britain : Its Use and
Misuse” he classified land into six categories, namely, (1) Forest and woodland (2) Arable land, (3) Meadow land and permanent grass, (4) Health and moorland, (5) Gardens orchards, nurseries and (6) Unproductive land: such as buildings, mines, wasteland, etc.

In the international classification of land use, there are nine major land use classes have been recognized: (1) settlement and non-agricultural land, (2) Horticulture, (3) Trees and permanent crops (4) Crop land, (5) Improved permanent pastures, (6) Improved gazing land, (7) Woodland, (8) Stamps and marshes and (9) Unproductive land.

In India various schemes have been proposed to classify the land into different uses. The National Atlas Organization in 1957 classified the land into nine categories Forest, Scrub, and Arable land with trees, Plantation, Pasture, and Wasteland, Alpine grass and scrub and, Glaciated region. The Damodar Valley region has classified land into ten major categories: (1) Field crop, (2) Orchards, (3) Dense forests, (4) Light forests, (5) Non-agricultural land, (6) Unproductive land, (7) Water bodies, (8) Cultivable waste, (9) Villages and (10) City and towns.

Landuse records department has officially classified land under following categories (1) Reporting area for land utilization purposes, (2) Forest, (3) Barren and uncultivable land, (4) Land put to non-agricultural uses (i) cultivable waste, (ii) Permanent pastures and other gazing land, (5) Land under miscellaneous tree crops and groves not included in net area sown; (i) Current fallows(ii) Other fallow land, (6) Net sown area, (7) Area sown more than once and (8) total cropped area.

It would be convenient for a clear understanding to condense to above mentioned twelve categories into five
categories as (1) Forest land, (2) Net sown area, (3) Land not available for cultivation, (4) cultivable waste and (5) Fallow land.

4-A.3: TEMPORAL VARIATIONS IN LANDUSE

The temporal variations in landuse pattern in the Nashik district have been studied for a period of forty years (1960-61 to 2000-01) and possible causes of changing landuse have been interpreted. The investigator could not succeed in uncovering temporal variations of landuse for consecutive years due to paucity of data for the years concerned. However, alternative year has been taken into consideration for showing temporal variations in landuse pattern in the area under study.

The temporal variations in landuse for Nashik district are studied in five categories as follows:

a. Net area Sown (NSA)
b. Land not available for cultivation, (LNAC),
c. Cultivable Waste (CW)
d. Fallow land (FL) and
e. Forest/Forest Cover (F)

The changes occurred during the period of study are interpreted as follows:

4-A.3.a: Net Sown Area (NSA)

The net sown area is steadily decreased since 1960-61 to 2000-2001 (Fig. 4.1). It is seen from table 4.1 that 59.25 percent area was under cultivation in 1960-61 and it has been stepped to 53.95 percent area under cultivation in 2000-01, registering decreased by 5.3 percent. This decrease may be attributed to
Table 4.1: Nashik District- Temporal Variation in General Landuse Pattern from 1961 to 2001 (Area in Percentages)

<table>
<thead>
<tr>
<th></th>
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<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Net Sown Area( NSA)</td>
<td>59.25</td>
<td>55.34</td>
<td>54.46</td>
<td>55.27</td>
<td>53.95</td>
</tr>
<tr>
<td>2.</td>
<td>Land not available for cultivation( LNAC)</td>
<td>9.83</td>
<td>11.53</td>
<td>10.96</td>
<td>8.16</td>
<td>9.75</td>
</tr>
<tr>
<td>a)</td>
<td>Land put to non-agricultural use</td>
<td>0.05</td>
<td>0.07</td>
<td>0.44</td>
<td>0.89</td>
<td>0.68</td>
</tr>
<tr>
<td>b)</td>
<td>Barren and uncultivated land</td>
<td>9.78</td>
<td>11.46</td>
<td>10.52</td>
<td>7.27</td>
<td>9.09</td>
</tr>
<tr>
<td>3.</td>
<td>Cultivable waste(CW)</td>
<td>6.11</td>
<td>3.03</td>
<td>5.68</td>
<td>7.45</td>
<td>6.74</td>
</tr>
<tr>
<td>a)</td>
<td>Permanent pastures and other grazing land</td>
<td>4.32</td>
<td>1.55</td>
<td>3.62</td>
<td>3.58</td>
<td>2.48</td>
</tr>
<tr>
<td>b)</td>
<td>Miscellaneous tree crops and groves not include to Net Sown Area</td>
<td>0.23</td>
<td>0.25</td>
<td>0.22</td>
<td>0.82</td>
<td>1.59</td>
</tr>
<tr>
<td>c)</td>
<td>Cultivable waste</td>
<td>1.56</td>
<td>1.23</td>
<td>1.84</td>
<td>3.05</td>
<td>2.67</td>
</tr>
<tr>
<td>4.</td>
<td>Fallow Land( FL)</td>
<td>3.06</td>
<td>8.42</td>
<td>7.34</td>
<td>8.43</td>
<td>8.44</td>
</tr>
<tr>
<td>a)</td>
<td>Current Fallow</td>
<td>1.08</td>
<td>5.57</td>
<td>3.85</td>
<td>6.37</td>
<td>6.34</td>
</tr>
<tr>
<td>b)</td>
<td>Fallow land other than current fallow</td>
<td>1.98</td>
<td>2.85</td>
<td>3.49</td>
<td>2.06</td>
<td>2.10</td>
</tr>
</tbody>
</table>

(Source: Socio-Economic Abstract- Nashik District)
increasing population, development of transportation routes and residential purpose. From 1960-61 to 1970-71 net sown area decreased by 3.91 percent in 1970-71 and 1980-81 it has decreased by 0.88 percent; from 1980-1981 to 1990-91 there is a slight increase (0.81%). It decreased 1.32 percent from 1990-91 to 2000-01. The total decrease between the study periods is 5.3 percent. This significant decrease in net sown area may be due to more land under roads, residuals subsequently under landput to non-agricultural use, cultivable waste and fallow land. There fore, other types of land have continuously increased from 1960-61 to 2000-01 (Fig. 4.1 and table 4.1).

4-A.3.b: Land Not Available For Cultivation (LNAC)

This category includes the landput to non-agricultural uses, barren and uncultivated land. The area under this category has shows the cyclic change from 1960-61 to 2000-01 in the study area. The total decline during the study period is only 0.08 percent (table 4.1). There is slight decline during the last two decades. The
land not available for cultivation has been decreasing due to the increase in the cultivable waste and fallow land. Figure 4.1 reveals the temporal variations in landput to non-agricultural uses. Non-agricultural land has been substantially increased for the study period from 1960-61 to 2000-01 (0.63%). While barren and uncultivated land slightly decrease between the study period (0.71%). More land in the past has been put to cultivation use, brought under non-agricultural use due to residential purpose and transport.

4-A.3.c: Cultivable Waste (CW)

In Nashik district, cultivable waste indicates less increase during the study period. In 1960-61, land under cultivable waste was 6.11 percent to the total geographical area while it is increased up to 0.63 percent in 2000-01 (table 4.1). The cultivable waste includes such sub types as permanent pasture and other grazing land, miscellaneous tree crops and groves not include in net sown area and cultivable waste.

The trend of cultivable waste is shown in fig. 4.1. The total increase in cultivable waste is only 0.63 percent from 1960-61 to 2000-01, that shows lightly upward trend. The permanent pasture and other grazing land decline by 1.84 percent, but miscellaneous tree and groves increased by 1.36 percent and cultivable waste increased by 1.11 percent. There was a small decline in permanent pasture and other grazing land while there was less increase in miscellaneous tree and groves and cultivable waste due to population pressure.

4-A.3.d: Fallow Land (FL)

The fallow land includes current fallow and other than current fallow. The current fallow means land kept uncultivated
for regaining fertility of soil and other purposes during the agricultural year. Other fallow land means land kept uncultivated more than five years due to various reasons i.e. non-availability of capital, lack of agricultural know-how. In study region both current fallow and other than current fallow show increased trend during the study period of 5.26 percent and 0.12 percent respectively while the total increase of fallow land is 5.38 percent (table 4.1). This fact suggests that less land under other fallow has been brought under cultivation. Moreover, there is a fluctuation in the area under fallow land from 1970-71 to 2000-01.

4-A.3.e: Forest (F)

In assessing the character of the vegetation type, a factor that can not be neglected in the long occupation of man and the consequent change on the vegetal carpet through agriculture. The type of vegetation met with any given locality depends on the climate, soil and past treatment has been emphasized by the leading plant ecologists. The influence of temperature and rainfall on plant life has received a special attention in the classifications of climate proposed by Koppen and Thornthwait.

Nasik district has 21.75 percent and 21.68 percent of land under forest cover during 1960-61 and 1970-71 respectively. There is almost no change in forest lands during a span of ten years. Whereas during 2000-2001, land under forest increases 0.43 percent between 1990-1991 and 2000-2001. The statistics shows that 6698 hectares. Geographical area has been increased under forest between 1990-91 and 2000-2001. Forest plays a dominant role in maintaining ecological and environmental balance in the district.
4-A.4: Comparative Study of Landuse in Nashik District and Maharashtra

Table 4.2 shows the area under different landuse categories in Nashik district and Maharashtra. Net sown area in the district is relatively less under cultivation (53.95%) and Maharashtra (57.34%). The less hectare of net sown area in Nashik district is attributed to highly diversified relief. Moreover presence of Sahyadrian mountain range and its offshoots spread within the district restricted land for cultivation. The percentage of land not available for cultivation is same as compare to Maharashtra, but the percentage of landput to non-agricultural use is very less (0.68%) as compare to the state (4.23%) while the percentage of barren and uncultivated land is maximum (9.07%) and in Maharashtra (5.51%).

Table 4.2 shows that land under permanent pasture and other grazing is less (2.48%) as compared to Maharashtra (4.36%) while land under miscellaneous tree crops and groves (1.59%) in Nashik district and it is less in Maharashtra (0.73%). This table also shows that negligible land under cultivable waste (2.67%) in Nashik district. It is less than Maharashtra (2.94%). The area under current fallow is maximum (6.34%) in Nashik and it is minimum in Maharashtra (3.87%), while the area under fallow land other than current fallow is less (2.1%) as compared to Maharashtra (3.77%). the area under forest is maximum in Nashik (21.12%) as compared to Maharashtra (17.25%).
Table 4.2: Landuse in Nashik District and Maharashtra (2000-01)

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Landuse Types</th>
<th>Nashik</th>
<th>Maharashtra</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Area in hectare</td>
<td>Area in %</td>
</tr>
<tr>
<td>1.</td>
<td>Net Sown Area (NSA)</td>
<td>837793</td>
<td>53.95</td>
</tr>
<tr>
<td>2.</td>
<td>Land not available for cultivation (LNAC)</td>
<td>151514</td>
<td>9.75</td>
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<tr>
<td>a)</td>
<td>Land put to non-agricultural use</td>
<td>10606</td>
<td>0.68</td>
</tr>
<tr>
<td>b)</td>
<td>Barren and uncultivated land</td>
<td>140908</td>
<td>9.07</td>
</tr>
<tr>
<td>3.</td>
<td>Cultivable waste (CW)</td>
<td>104613</td>
<td>6.74</td>
</tr>
<tr>
<td>a)</td>
<td>Permanent pastures and other grazing land</td>
<td>38498</td>
<td>2.48</td>
</tr>
<tr>
<td>b)</td>
<td>Miscellaneous tree crops and groves not include to Net Sown Area</td>
<td>24688</td>
<td>1.59</td>
</tr>
<tr>
<td>c)</td>
<td>Cultivable waste</td>
<td>41427</td>
<td>2.67</td>
</tr>
<tr>
<td>4.</td>
<td>Fallow Land (FL)</td>
<td>131117</td>
<td>8.44</td>
</tr>
<tr>
<td>a)</td>
<td>Current Fallow</td>
<td>98469</td>
<td>6.34</td>
</tr>
<tr>
<td>b)</td>
<td>Fallow land other than current fallow</td>
<td>32648</td>
<td>2.10</td>
</tr>
<tr>
<td>5.</td>
<td>Forest (F)</td>
<td>327979</td>
<td>21.12</td>
</tr>
<tr>
<td>6.</td>
<td>Total Geographical Area</td>
<td>1553016</td>
<td>100</td>
</tr>
</tbody>
</table>

(Source: Socio-Economic Abstract- Nashik District)
The spatial pattern in landuse in Nashik district is the result of interaction between physical environment and socio-economic environment. But the impact of regional and local factors is clearly evident from the landuse patterns. Besides these factors, amount of rainfall exerts profound influence on the types of landuse in the Nashik district. The overall landuse has been categorized into different subtypes on the basis of recommendations made by Food and Agricultural Department, Government of India. These subtypes are as follows;

a. Net area Sown (NSA)

b. Land not available for cultivation, (LNAC)
   a) Land put to non-agricultural uses,
   b) Barren and unc cultivable land

c. Cultivable Waste (CW)
   a) Permanent pastures and other grazing land,
   b) Land under miscellaneous tree crops and groves not included in net sown area
   c) Cultivable waste

d. Fallow land (FL)
   a) Current fallow land and,
   b) Fallow land other than current fallow, and,

e. Forest/Forest Cover (F)

The above mentioned categories have been used to examine the spatial pattern of landuse in Nashik district. The percentage of each landuse type has been calculated to total geographical area of the district. The percentage area of landuse type has given in Table 4.3(1960-61) and 4.4(2000-01).
4-A.5.a: Net Sown Area

The net sown area includes land actually under food crops, cash and fodder crops. The Nashik district has 53.95 percent land under cultivation to total geographical area showing relatively less area than that of Maharashtra (57.34 %) as per 2000-01. This peculiarity of the land pattern of the district can be accounted by the presence of Sahyadrian Mountain range and its offshoots spread within the district.

Table 4.3 and Map 4.1 reveals the spatial variations in the percentage of net sown area to total geographical area in the Nashik district (1960-61). It is observed from this map that net sown area was maximum (more than 70 percent) in Niphad (81.4%) followed by Yeola (76.4%), Chandwad 73.00%) and Sinner (71.6%) while it was minimum (less than 50 percent) in Peth (32.3%) and Surgana (36.2%). This is the outstanding trend of net sown area. This can be explained by the fact that the north-western part (Peth, Surgana) of the district occupied by Sahyadrian mountain range that is almost forest land, unsuitable and low fertility soil. As a result, comparatively less percentage of area has been brought under cultivation. Remaining part of the district (Godavari, Girna and Mosam River Basin) is low-lying plain with medium to deep black soil, suitable for extensive land under plough.

Table 4.4 and map 4.2 clearly shows that in 2000-01, there was great change or decrease in the percentage of net sown area to total geographical area. Overall the district the percentage of net sown area decreased (5.3%) in the study period. Net sown area increased in Peth (7.1%), Surgana (1.7%) and Igatpuri 8.5%) while the remaining part of the district the percentage of net sown
<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Tahsil/Taluka</th>
<th>NSA</th>
<th>LNAC</th>
<th>CW</th>
<th>FL</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Nashik</td>
<td>54.3</td>
<td>15.5</td>
<td>12.1</td>
<td>3.7</td>
<td>14.4</td>
</tr>
<tr>
<td>2</td>
<td>Peth</td>
<td>32.3</td>
<td>4.8</td>
<td>7.5</td>
<td>5.4</td>
<td>50.0</td>
</tr>
<tr>
<td>3</td>
<td>Dindori</td>
<td>63.1</td>
<td>8.6</td>
<td>6.6</td>
<td>5.4</td>
<td>16.3</td>
</tr>
<tr>
<td>4</td>
<td>Surgana</td>
<td>36.2</td>
<td>3.0</td>
<td>6.3</td>
<td>1.5</td>
<td>53.0</td>
</tr>
<tr>
<td>5</td>
<td>Kalwan</td>
<td>52.1</td>
<td>6.7</td>
<td>6.1</td>
<td>1.6</td>
<td>33.5</td>
</tr>
<tr>
<td>6</td>
<td>Satana</td>
<td>54.5</td>
<td>8.0</td>
<td>5.3</td>
<td>2.7</td>
<td>29.5</td>
</tr>
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<td>7</td>
<td>Malegaon</td>
<td>59.7</td>
<td>12.2</td>
<td>5.4</td>
<td>2.3</td>
<td>20.4</td>
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<td>8</td>
<td>Chandwad</td>
<td>73.00</td>
<td>13.1</td>
<td>2.2</td>
<td>1.6</td>
<td>10.1</td>
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<td>9</td>
<td>Nandgaon</td>
<td>55.7</td>
<td>14.6</td>
<td>3.5</td>
<td>2.1</td>
<td>24.1</td>
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<tr>
<td>10</td>
<td>Yeola</td>
<td>76.4</td>
<td>4.8</td>
<td>7.0</td>
<td>1.6</td>
<td>10.2</td>
</tr>
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<td>11</td>
<td>Niphad</td>
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<td>6.1</td>
<td>8.9</td>
<td>2.5</td>
<td>1.1</td>
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<tr>
<td>12</td>
<td>Sinner</td>
<td>71.6</td>
<td>13.5</td>
<td>1.9</td>
<td>2.4</td>
<td>10.6</td>
</tr>
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<td>13</td>
<td>Igatpuri</td>
<td>51.7</td>
<td>12.3</td>
<td>7.4</td>
<td>7.3</td>
<td>21.3</td>
</tr>
<tr>
<td>14</td>
<td>Trimbak</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>15</td>
<td>Deola</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>59.25</td>
<td>9.83</td>
<td>6.1</td>
<td>3.06</td>
<td>21.75</td>
</tr>
</tbody>
</table>

(Source: Socio-Economic Abstract- Nashik District)
Map 4.1: Nashik District-Tahsilwise Landuse (1960-61)

- Net Sown Area
- Land Not Available For Cultivation
- Cultivable Waste
- Fallow Land
- Forest

N
0 20 km
Table 4.4: Nashik- General Landuse (2001) Area in Percentage

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Tahsil/ Taluka</th>
<th>LANDUSE TYPES</th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
<td>NSA</td>
</tr>
<tr>
<td>1</td>
<td>Nashik</td>
<td>26.7</td>
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<tr>
<td>2</td>
<td>Peth</td>
<td>39.4</td>
</tr>
<tr>
<td>3</td>
<td>Dindori</td>
<td>54.4</td>
</tr>
<tr>
<td>4</td>
<td>Surgana</td>
<td>37.9</td>
</tr>
<tr>
<td>5</td>
<td>Kalwan</td>
<td>42.3</td>
</tr>
<tr>
<td>6</td>
<td>Satana</td>
<td>49.3</td>
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<tr>
<td>7</td>
<td>Malegaon</td>
<td>58.0</td>
</tr>
<tr>
<td>8</td>
<td>Chandwad</td>
<td>68.5</td>
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<td>9</td>
<td>Nandgaon</td>
<td>48.2</td>
</tr>
<tr>
<td>10</td>
<td>Yeola</td>
<td>68.6</td>
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<tr>
<td>11</td>
<td>Niphad</td>
<td>68.8</td>
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<tr>
<td>12</td>
<td>Sinner</td>
<td>58.4</td>
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<td>13</td>
<td>Igatpuri</td>
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<td>14</td>
<td>Trimbak</td>
<td>43.2</td>
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<td>15</td>
<td>Deola</td>
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</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>53.95</td>
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</tbody>
</table>

(Source: Socio-Economic Abstract- Nashik District)
Table 4.5: Percentage Variation in General Landuse

(Between 1960-61 to 2000-01)

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Tahsil/Taluka</th>
<th>NSA</th>
<th>LNAC</th>
<th>CW</th>
<th>FL</th>
<th>F</th>
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<tbody>
<tr>
<td>1</td>
<td>Nashik</td>
<td>-27.6</td>
<td>-2.7</td>
<td>+11.8</td>
<td>+21.6</td>
<td>-3.1</td>
</tr>
<tr>
<td>2</td>
<td>Peth</td>
<td>+7.1</td>
<td>+2.2</td>
<td>-7.3</td>
<td>-5.3</td>
<td>+3.3</td>
</tr>
<tr>
<td>3</td>
<td>Dindori</td>
<td>-8.7</td>
<td>-4.2</td>
<td>+0.8</td>
<td>+9.6</td>
<td>+2.5</td>
</tr>
<tr>
<td>4</td>
<td>Surgana</td>
<td>-1.7</td>
<td>+1.7</td>
<td>-4.6</td>
<td>+2.2</td>
<td>-1.0</td>
</tr>
<tr>
<td>5</td>
<td>Kalwan</td>
<td>-9.5</td>
<td>-1.5</td>
<td>+6.7</td>
<td>+3.5</td>
<td>+1.1</td>
</tr>
<tr>
<td>6</td>
<td>Satana</td>
<td>-5.2</td>
<td>+7.0</td>
<td>-2.0</td>
<td>+1.4</td>
<td>-1.2</td>
</tr>
<tr>
<td>7</td>
<td>Malegaon</td>
<td>-1.7</td>
<td>+2.1</td>
<td>-1.6</td>
<td>+0.1</td>
<td>+1.1</td>
</tr>
<tr>
<td>8</td>
<td>Chandwad</td>
<td>-4.5</td>
<td>-3.7</td>
<td>+5.0</td>
<td>+3.5</td>
<td>-0.3</td>
</tr>
<tr>
<td>9</td>
<td>Nandgaon</td>
<td>-7.5</td>
<td>-0.8</td>
<td>+3.0</td>
<td>+3.6</td>
<td>+1.7</td>
</tr>
<tr>
<td>10</td>
<td>Yeola</td>
<td>-7.5</td>
<td>+5.7</td>
<td>-2.1</td>
<td>+8.6</td>
<td>-4.4</td>
</tr>
<tr>
<td>11</td>
<td>Niphad</td>
<td>-12.6</td>
<td>+2.7</td>
<td>-1.8</td>
<td>+11.7</td>
<td>nil</td>
</tr>
<tr>
<td>12</td>
<td>Sinner</td>
<td>-13.2</td>
<td>-3.0</td>
<td>+6.0</td>
<td>+6.8</td>
<td>+3.4</td>
</tr>
<tr>
<td>13</td>
<td>Igatpuri</td>
<td>+8.5</td>
<td>+0.2</td>
<td>+2.4</td>
<td>+7.7</td>
<td>-18.8</td>
</tr>
<tr>
<td>14</td>
<td>Trimbak</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>15</td>
<td>Deola</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>-5.3</td>
<td>-0.08</td>
<td>+0.63</td>
<td>+5.38</td>
<td>-0.63</td>
</tr>
</tbody>
</table>

(Source: Research Student)
area goes on decrease. In 2000-2001, maximum percentage (more than 60 percent) of land under net sown area is found at Deola (73.6%) followed by Niphad (68.8%), Yeola (68.6%), Chandwad (68.5%) and Igatpuri (60.2%).

The category consisting 50 to 60 percent net sown area to the total geographical area is shown in map 4.2 and table 4.4. Only three tahsils comes under this category i.e. Sinner (58.4%), Malegaon (58.0%) and Dindori (54.4%). While 40 to 50 percent net sown area observed in Satana (49.3%) followed by Nandgaon (48.2%), Trimbak (43.2%) and Kalwan (42.3). Below 40 percent net sown area observed in Nashik tahsil (26.7%), followed by Surgana (37.9%) and Peth (39.4%).

Table 4.5 shows the percentage variation in general landuse between the study periods. The percentage of net sown area increased in Peth, Surgana and Igatpuri tahsils while in reaming tahsils the percentage of net sown area goes on decrease. This significant decrease in net sown area may be due to more land under roads, residuals subsequently under landput to non-agricultural use, cultivable waste and fallow land. After the overall observation of Nashik district there was decrease in the percentage of net sown area (-5.3%), land not available for cultivation (-0.08%) and forest (-0.62%) while the percentage increase in cultivable waste (+0.63%) and fallow land (5.38%).

4-A.5.b: Land Not Available for Cultivation (LNAC)

This is divided into following types;

a) Land-put to non-agricultural uses: Land occupied by settlements, roads, railways, streams, canals and rivers are included in this type.
b) **Barren and uncultivable land**: Outcrops of hills and mountains are included in this type. The small part of this land can be brought under cultivation of very high costs. Generally, barren and uncultivated land is associated with poor soils, heavy rainfall and intense erosion.

In 1960-61 more than 10 percent land not available for cultivation is observed in Nashik, Nandgaon, Sinner, Chandwad, Igatpuri and Malegaon tahsils; while remaining tahsils observed less than 10 percent land not available for cultivation (table 4.3 and map 4.1). As well as in 2000-01, there is significance change in land not available for cultivation. Table 4.4 and map 4.2 shows that seven tahsils falls in the range of 10 to 15 percent of land not available for cultivation in the study area. While in remaining tahsils having less than 10 percent land not available for cultivation.

In the Nashik district, the land not available for cultivation is 9.83 percent (1960-61) to the total geographical area; it decreases 0.08 percentages (9.75%) in 2000-01. This type shows considerable variations within the district (table 4.5). The land not available for cultivation (9.75%) is almost same to that of the Maharashtra (9.74%). The percentage of land not available for cultivation is highly increased in Satana (+7.0%) followed by Yeola (+5.7%), while it is highly decreased in Dindori (-4.2%) followed by Chandwad (-3.7%) and Sinner (-3.0%) between the study period.

**4-A.5.c: Cultivable waste (CW)**

The cultivable waste land includes other uncultivated lands excluding fallow land. This category is divided into three types. a) Permanent pastures and other grazing lands, b) Miscellaneous
tree crops and groves and c) cultivable waste. The permanent pastures and grazing lands include all land, are under grass-cover, government and private land; or permanent pastures which are kept reserved as a village common grazing ground or vast tract of protected land, not open for free grazing and unreserved grass land. The miscellaneous tree crops and groves include land under grasses, bamboo, bushes and other groves for fuels etc. which not included under orchards or forests are included in this category and, the land not cultivated during the preceding five years is called cultivable waste.

The Nashik district has 6.11 percent (1960-61) and 6.74 percent (2000-01) to total land under cultivable waste (table 4.3 and 4.4). It is slightly increase (+0.63%) between the study period and 1.29 percent less as compared to Maharashtra. The cultivable waste is observed in varied ranges within the district. One comes across the maximum cultivable waste at Nashik (12.1% in 1960-61 and 23.9% in 2000-01) and the minimum at Sinner (1.9% in 1960-61) and Peth (0.2% in 2000-01) in the study period. In 1960-61, Chandwad and Nandgaon come under less than 5 percent cultivable waste to the total geographical land and remaining tahsils having 5 to 10 percent cultivable waste land. While in 2000-01, Surgana, Trimbak, Satana, Malegaon, Deola and Yeola observed less than 5 percent of cultivable waste land as well as remaining tahsils observed 5 to 10 percent cultivable waste land.

Table 4.5 clearly shows that there is significant variation in cultivable waste between the study periods. There is high percentage of cultivable waste land increased at Nashik tahsil (+11.8%) followed by Kalwan (+6.7%), Sinner (+6.0%) and Chandwad (+5.0%) while the percentage of cultivable waste land
highly goes on decreased at Peth (-7.3%) followed by Surgana (-4.6%) and Yeola (-2.1%).

4-A.5.d: Fallow Land (FL)

The Nashik district has 3.06 percent area in 1960-61 and 8.44 percent area in 2000-01 to its total area under fallow land. The fallow land is generally, divided into two categories; (a) current fallow land and (b) other than current fallow land. The current fallow land includes the land which is not cultivated during the current year due to variety of regions i.e. as phase to rotation, for regaining fertility or due to some other constrains. The land than current land includes arable area which is taken up for cultivation but has gone temporarily out of cultivation for a period of not more than five years.

The Nashik district has 3.06 percent (1960-61) and 8.44 percent (2000-01) to total area under fallow land (table 4.3 and 4.4). It is increased (+5.38%) between the study period and 0.8 percent more as compared to Maharashtra (2000-01). The fallow land is observed in varied ranges within the district. One comes across the maximum fallow land at Igatpuri (7.3% in 1960-61) and Nashik (25.3% in 2000-01) while the minimum at Surgana (1.5% in 1960-61) and Peth (0.1% in 2000-01) in the study period. In 1960-61, Igatpuri, Peth and Dindori observed more than 5 percent fallow land in 1960-61, while remaining tahsils observed less than 5 percent of fallow land to the total geographical area. As well as in 2000-01, high percentage of fallow land will be observed at Dindori and Igatpuri (15%) followed by Niphad (14.2%), Yeola (10.2%) and Sinner (9.2%). While Malegaon (2.4%), Surgana (3.7%) and Satana (4.1%)
observed low percentage (less than 5 %) of fallow land in the district.

Table 4.5 clearly shows that there is great variation in fallow land between the study periods. There is high percentage of fallow land increased at Nashik tahsil (+21.6%) followed by Niphad (+11.7%), Dindori (+9.6%) and Yeola (+8.6%) while the percentage of fallow land highly goes on decreased at Peth (-5.3%) only.

4-A.5.e: Forest Land (F)

In assessing the character of the vegetation type, a factor that can not be neglected in the long occupation of man and the consequent change on the vegetal carpet through agriculture. The type of vegetation met with any given locality depends on the climate, soil and past treatment has been emphasized by the leading plant ecologists.

The Nashik district has 21.75 percent (1960-61) and 21.12 percent (2000-01) of total area under forest land (table 4.3 and 4.4). It is decreased (-0.63%) between the study period and 3.87 percent more as compared to Maharashtra (2000-01). The forest land is observed almost in stable range within the district. One comes across the maximum forest land at Surgana( 53.0%) followed by Peth ( 50.0%) in 1960-61 and Peth ( 53.3%) followed by Surgana ( 52.0%) in 2000-01, while the minimum at Niphad ( 1.1%) in 1960-61 and 2000-01 in the study period.

Table 4.5 clearly shows that there is significant variation in forest land. There is high percentage of forest land increased at Sinner ( +3.4%) followed by Peth( +3.3%), Dindori ( +2.5%) and Nandgaon ( +1.7%) while the percentage of forest land highly goes on decreased at Igatpuri ( -18.8%) followed by Yeola
( -4.4%) and Nashik ( -3.1%). There is not more decrease in forest land in the district. But the density of trees goes on decreased day by day.

4-B: AGRICULTURAL LANDUSE
4-B.1: INTRODUCTION

After unfolding the various categories of general landuse in Nashik district in the earlier chapter, it would be worthwhile to explain agricultural landuse pattern in the area for individual crops to explicate the crop growth and crop pattern. The term, “Agricultural Landuse” denotes the extent of the gross cropped area during the year under various crops. It is the result of the decision made by the farmers regarding the choice of crops and methods for production. Thus, this decision-making is based on not only the physical constraints and limitations but also depends on farmer’s perception of the total environment. His perception of environment is related to contents and nature of available information, much of which is based on traditional approach. The physical as well as cultural environment reflects of crops growth, production and changes.

The present chapter attempts to expound the agricultural landuse, its growth and crop pattern in relation to the physio-socio-economic conditions prevalent in the basin and highlights the use of cropland in the context of existing crop ecology, their spatial distribution, and methods of farm operation and to discuss the possible causes for the existing cropland pattern in the basin.

The area under various crops have been obtained from concerned talukas and it was converted into percentage to net sown area, which are later on used for depicting the distribution of individual crops. The distribution of landuse patterns show
variations in agricultural landuse in the Nashik district. The information collected during field work sustains explanations. The District Census Handbook, Gazetteer and Socio-economic Abstract of Nashik District have been used for explaining the agricultural landuse patterns and Analytical expositions on crop pattern have been attempted.

4-B.2: AGRICULTURAL LANDUSE PATTERNS

The spatial and temporal variations in agricultural landuse patterns have been studied in the area under review. The spatial distribution patterns were studied for the year i.e. 2000-2001, while temporal study were made for the period of 1960-61 to 2000-2001. The investigator could not succeed in displaying temporal variations for consecutive years due to lack of data for the concerned taluka. Hence, decadal data has been taken into account for temporal study of agricultural landuse in Nashik district.

4-B.3: CROPS AND SEASONS

There are two agricultural seasons in Nashik district, viz. kharif and Rabi. The kharif crops are sown in June and July and harvested at the end of October or early November, while Rabi crops are sown in October or mid-November and harvested in month of February or March. The kharif crops are rice, bajra, jawar, nachani, cotton, pulses, maiz, groundnut, and vegetable, while Rabi crops are wheat, rabi jawar and gram.

4-B.4: TEMPORAL VARIATION IN AGRICULTURAL LANDUSE PATTERNS

The crop pattern in any region cannot remain static due to the variations in the rainfall amount and nature of inputs and environmental instability. Moreover, introduction of new high
Table 4.6: Temporal Variation in Agricultural Landuse
(1960-61 to 2000-2001)

<table>
<thead>
<tr>
<th>Crops</th>
<th>Decades</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1960-61</td>
<td>2000-2001</td>
</tr>
<tr>
<td></td>
<td>Area (in %)</td>
<td>Area (in %)</td>
</tr>
<tr>
<td>Bajara</td>
<td>40.2</td>
<td>36.6</td>
</tr>
<tr>
<td>Pulses</td>
<td>11.43</td>
<td>8.22</td>
</tr>
<tr>
<td>Jawar</td>
<td>9.13</td>
<td>14.5</td>
</tr>
<tr>
<td>O. S.</td>
<td>13.35</td>
<td>7.47</td>
</tr>
<tr>
<td>Wheat</td>
<td>10.95</td>
<td>13.8</td>
</tr>
<tr>
<td>Nach.</td>
<td>6.89</td>
<td>8.12</td>
</tr>
<tr>
<td>Rice</td>
<td>4.25</td>
<td>4.88</td>
</tr>
<tr>
<td>Veg.l</td>
<td>1.61</td>
<td>2.54</td>
</tr>
<tr>
<td>Fodd.</td>
<td>0.17</td>
<td>0.72</td>
</tr>
<tr>
<td>S. C.</td>
<td>1.07</td>
<td>1.86</td>
</tr>
<tr>
<td>Fruits</td>
<td>0.2</td>
<td>0.5</td>
</tr>
<tr>
<td>Other</td>
<td>0.93</td>
<td>1.88</td>
</tr>
</tbody>
</table>

(Source: Revenue Records)

Note: The year 1960-61 is considered as base year.
Fig. 4.2: Temporal variation in the area of major crops.
yielding varieties of Seeds, irrigation facilities and technical know-how are responsible for temporal changes. Such changes in cropping patterns are differing from taluka to taluka and region to region. Therefore it is worthwhile to study isolated causes of change occurring through space and time.

Fig.4.2 displays the temporal variations in cropping pattern in the Nashik district from 1960-1961 to 2000-2001. The identified possible main features of temporal variations in cropping pattern summarized as below;

Bajra is predominant in the area under review since 1961. The areal extent of bajra has recorded steady decrease during the study period. The total decrease of bajra is 0.39 percent from 1960-61 to 2000-2001 (table 4.6). Bajra was cultivated 40.2 percent in the year 1960-61 and it is cultivated more than 33.4 percent (except 1980-81). During 1990-91 the net sown area under bajra reveals highest increase (12.2 percent). The introduction of new high yielding varieties of seeds may be important for increasing area and yield of bajra in the district.

The areal extent under pulses in the district had successfully cultivated before 1960-61 on the area of 11.43 percent to total net sown area. The decreasing in area under pulses was registered for the following years. It has been reduced 7.8 percent in 2000-2001. The total decline of pulses from 1960-61 to 2000-01 was 3.63 percent except in 1980-81 where it has 3.4 percent increase in the district.

The areas under Jawar declined in the study period. The decreasing in area under jawar was registered for the following years. It has been declined 3.73 percent in 2000-01. The total decline of jawar from 1960-61 to 2000-01 is 5.4 percent except in
1970-71 where it has 5.4 percent increase respectively in the district.

Table 4.6 shows 7.24 percent to net sown area under oilseeds has decreased during study period (1960-61 to 2000-01). It is noticed from table 4.6 that the oilseeds was found 13.35 percent area in 1960-61 while it reduced 6.11 percent to net sown area in 2000-01. The area under oilseeds goes on decrease throughout the study period.

It is clear from table 4.6 that area under wheat was 10.95 percent to net sown area in 1960-61 which was further increase 2.85 percent in 1970-71. From 1980-81 to 2000-01 the area under wheat goes on decrease. The total decrease is 6.24 percent between the study periods.

The areas under Nachani have declined between the study periods. The areal extent of nachani in the district has successfully cultivated up to 1970-71. The area under Nachani was 6.89 percent in 1960-61 it was increased up to 1.23 percent in 1970-71. From 1970-71 the area under nachani goes on decline. The total decline of area under Nachani is 1.44 percent between the study periods.

Table 4.6 shows 1.39 percent to the net sown area under rice has increased during the study period (1960-61 to 2000-01). It is noticed from fig.4.2 that the rice was found 4.25 percent area in 1960-61, while it increased 5.64 percent to net sown area in 2000-01. The maximum area under rice was registered in the years 1990-91 and 2000-01 (5.64 percent) in the district.

The area under vegetable in the district had successfully cultivated after 1960-61. In 1960-61 area under vegetable was 1.61 percent which is increased to 6.29 percent (table 4.6) between
the study period. In 2000-01 area under vegetable rapidly increase and reach up to 7.9 percent to total net sown area of the district.

Table 4.6 shows 5.2 percent to net sown area under fodders has increased during study period (1960-61 to 2000-01). It is clearly shown in fig.4.2 that the fodder crops was found 0.17 percent area in 1960-61, while it increased to 5.37 percent to net sown area in 2000-01. The maximum area under fodder crops was registered in the year 1980-81 (7.77 percent) in the district.

Sugarcane is one of the important cash crops in the district. The areal extent under sugarcane in the district has increased up to 1990-91. In 1960-61 area under sugarcane was 1.07 percent which is increased to 2.43 percent (table 4.6) between the study periods. The maximum area under sugarcane was registered in the year 1990-91 (3.63 percent) in the district.

The areal extent under fruits in the district has successfully cultivated after 1960-61. In 1960-61 area under fruits was only 0.2 percent which is increased to 3.05 percent during the study period. Table 4.6 shows that there is significant increase in the area under fruits in the district.

Other crops have remained unaffected during the study period except the year 1970-71 and 2000-01 which is increased to 1.88 percent and 2.15 percent (table 4.6). The total increase was 1.22 percent.

The temporal variation reflects on major changes with upward trend in the area under rice, vegetable, fodder crops, sugarcane, fruits and other crops and hence the area under bajra, pulses, jawar, oilseeds, wheat and nachani decreased due to
increasing demand of other crops like vegetable, fruits and fodder milk supply zone is increasing in the district.

**4-B.5: SPATIAL ANALYSIS OF AGRICULTURAL LANDUSE**

Nashik district is an important region involving 20.5 percent working force in agricultural practice. The crops viz. Bajra, Rice, Nachani, Wheat, Jawar, Maiz, Vegetable, Pulses, Fodder crops, Oil-seeds, Sugarcane and Fruits are cultivating in the district. The variations in areal extent under these crops are mostly depending on adoption of improved varieties of seeds for sowing, local environment and traditional approach of farmers in the area under review. Besides these soil types and rainfall influencing on the crop cultivation and cropping pattern. The relative importance of kharif and Rabi crops is shown in fig.4.3A. It is seen that more than three-fourth area under plough in kharif (91.74 percent to net sown area) and less than one-fourth is under Rabi (8.26 percent to net sown area) season in the district. The relative importance of individual crop in kharif and rabi are shown in fig.4.3B.

The relative significance of crops and their spatial variation in the area under review has studied in detail with studying crop ecology, land operations and spatial distribution of crops in Nashik district.

**4-B.5.1: Bajra**

Bajra is the principal crop in Nashik district. It is rainfed crop cultivated in kharif season. This crop is raised in 13 tahsils of the district and occupying 329109 hectares (39.8 percent to net sown area) area of the district. The average annual rainfall amount and soil types in the district favor the cultivation of bajra in every village in the 13 tahsils except Peth and Surgana tahsil. Peth and
Surgana tahsils are not cultivating bajra due to hilly area and heavy rainfall.

Table 4.7: Agricultural Landuse of Nashik District (2000-01)

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Crops</th>
<th>Area (in Hectares)</th>
<th>Percent of Net Sown Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bajra</td>
<td>329109</td>
<td>39.8</td>
</tr>
<tr>
<td>2</td>
<td>Vegetables</td>
<td>64347</td>
<td>7.67</td>
</tr>
<tr>
<td>3</td>
<td>Pulses</td>
<td>64134</td>
<td>7.64</td>
</tr>
<tr>
<td>4</td>
<td>Fodder Crops</td>
<td>62186</td>
<td>7.41</td>
</tr>
<tr>
<td>5</td>
<td>Oil-Seeds</td>
<td>50523</td>
<td>6.02</td>
</tr>
<tr>
<td>6</td>
<td>Rice</td>
<td>46536</td>
<td>5.54</td>
</tr>
<tr>
<td>7</td>
<td>Nachani</td>
<td>40220</td>
<td>4.79</td>
</tr>
<tr>
<td>8</td>
<td>Wheat</td>
<td>38945</td>
<td>4.64</td>
</tr>
<tr>
<td>9</td>
<td>Jawar</td>
<td>30860</td>
<td>3.68</td>
</tr>
<tr>
<td>10</td>
<td>Sugarcane</td>
<td>28967</td>
<td>3.45</td>
</tr>
<tr>
<td>11</td>
<td>Fruits</td>
<td>26897</td>
<td>3.2</td>
</tr>
<tr>
<td>12</td>
<td>Maize</td>
<td>20159</td>
<td>2.4</td>
</tr>
<tr>
<td>13</td>
<td>Other Cereals</td>
<td>18623</td>
<td>2.22</td>
</tr>
<tr>
<td>14</td>
<td>Other Crops</td>
<td>17829</td>
<td>2.12</td>
</tr>
</tbody>
</table>

(Source: Socio-Economic Abstract - Nashik District)

Ecological condition:

Bajra can grow successfully in tropical and sub-tropical climate. It requires temperature between 18\(^0\) to 29\(^0\) C and average annual rainfall between 600 and 1000 mms. Generally bajra is sown later and reaped earlier than jawar. It is usually grown on light to medium black soils.

Spatial Distribution:

Bajra is successfully grown in Nashik district. The spatial distribution of bajra is shown in map4.3. Map 4.3 shows that this crop is found in three categories as under;

1. The area more than 40 percent to the net sown area in the district: The area of land occupying more than per cent of net sown area under bajra is found in the eastern and south part of
the district (map4.3). The concentration of the cultivation of this crop is in the tahsils viz Sinner (67.67 Per cent), Nandgaon (62.00 per cent), and Malegaon. (61.5 percent), Yeola (59.63 per cent), Satana (57.34 per cent) and Chandwad (52.91 per cent).

2) Land occupying between 20 to 40 percent to net sown area: The second category of 20 to 40 per cent area under bajra to net sown area occurs in two tahsils viz Niphad (30.62 per cent) and Kalwan (23.53 per cent) in the district.

3) Area less than 20 percent to net sown area under bajra: Nashik and Dindori tahsils in the district occupying less than 20 per cent area of net sown area under bajra (map4.3).

4-B.5.2: Vegetables

Vegetable ranks second in the district. It accounts for 7.67 per cent to the net sown area (64347 hectares). Vegetables are extensively grown in Nashik district due to the nearness of the district head quarter and Mumbai market where much of the produce is sold profitably. Besides the land and climatic condition in Nashik is very favorable for vegetable cultivation. It occupied an area of 64347 hectares in 2000-2001. Except the western hilly part consisting of Peth and Surgana tahsils vegetables are extensively grown in the rest of the district. The main vegetables grown in the district are onion, brinjal, fenugreek, lady’s finger, carrot, sweet potato, potato, cabbage, tomato, radish etc.

Ecological condition:

Onion is the most important and area under onion is more as compare to other vegetables. It is produced in the kharif as well as Rabi seasons. The kharif crop is produced between August and November, while the Rabi crops is sown in November and
harvested in February. It requires a variety of soils, such as rich, sandy or medium black or black clayey loams.

Tomato is a considerable needful next to onion; tomato is widely grown in the district. Well drained light brown or black medium soils are suitable for the crop. The crop gets ready in 2.5 to 3.0 months. When the Fruits tomato change colors from green to red are harvested. Picking of red tomatoes is done at the frequency of three times in a fortnight.

Cabbage cultivation is mainly concentrated in Nashik, Dindori and Kalwan tahsils. Sandy loam and clay loam soils are suitable for this crop. Many time cabbages are grown along with cauliflower. Carrot is another most important vegetable widely grown in the district. The crop can be grown on sandy to medium clay soils.

Potato is grown where the rainfall ranges between 65 cm to 110 cm. and where the temperature is $60^0$ to $70^0$ F. It requires well-drained soil with a sandy loam or black cotton clayey texture. In the district, it is produced as a Rabi crop. The crop is ready for harvest within 90 days. Fenugreek is another important crop grown in the district. It is grown in garden land at any time of the year. Besides the other vegetables grown in the district are lady’s finger, radish, sweet potato etc.

**Spatial Distribution:**

Vegetables are extensively grown in all the tahsils in the district except Peth and Surgana. The distribution of vegetable in the district shown as under;

1) **Area more than 10 per cent to net sown area:** The most concentration of vegetable is found in four tahsils. These tahsils has more than 10 per cent land to net sown area under
this crop (Map 4.4). This area receives average annual rainfall between 500 to 750 mm. Four tahsils have observed more than 10 per cent to the net sown area in this category. These tahsils are Chandwad (18.14 per cent), Nashik (12.03 Per cent), Niphad (10.87 per cent) and Yeola (10.79 per cent).

2) **Land between 5 to 10 per cent:** About 5 to 10 per cent land under vegetables is found in five tahsils, viz. Sinner (7.99 Per cent), Dindori (6.9 Percent), Malegaon (6.01 Per cent), Kalwan (5.89 per cent) and Nandgaon (5.78 per cent).

3) **Less than 5 percent area under vegetable:** Satana and Sinner observed that there is less than 5 per cent land under vegetable to the net sown area (map 4.4).

4-B.5.3: **Pulses**

Pulses rank third in the district. It accounts for 7.64 per cent to the net sown area (64134 hectares) in the district. The chief pulses grown in the district are gram, horse grame, black-grame, mug and tur while math, chavali, vatana and Val are also grown on a small scale.

**Ecological condition:**

Gram occupies a prominent place and is grown extensively in the district. The area under gram was 15555 hectare in 2000-2010. It is produced as a Rabi crop. Severe cold, frost and cloudy weather do great damage to the crop. It is sown as a single crop in heavy soil, where it gives high yields, while in light soils; it is taken as a mixed crop. The land is made ready by September for sowing. The gram crop matures in about four months.

Next to gram Kulith (horse-gram) assumes an important place among the pulses in the district. It is grown either in rows or
with other crops in the kharif season. It is produced on deep red loams to black cotton soil, clay stony and poor sandy loam soils. The mix crop is sown in July. If sown mixed, it is found in all rows. Otherwise it is sown in the fourth row. The crop is sown as a subordinate to bajra or sometimes with Niger seed.

Mug is grown in the kharif season between June and August. It is grown on ordinary black and red soils. The crop becomes ready for harvesting after three and half months.

Tur is generally sown in June or July and is ripe for harvest either in February or in March. It is generally taken as a mixed crop with cotton, groundnut, jawar or bajra. Well-drained and medium to heavy soils are suitable for this crop. The crop is harvested from January onwards.

Udid is produced generally as a mixed crop either with jawar or with bajra in the kharif season. It is sown on black cotton, clayey soil, or light red or brown alluvial soil. The land is prepared by two ploughings followed by two harrowing.

**Spatial Distribution:**

Pulses ranks third accounting for 7.64 per cent (64134 hectares) to net sown area for 2000-01 in Nashik district. The maximum area of pulses is found at Surgana (20.29 percent to net sown area) in north-western part whereas minimum area under pulses is at Dindori (1.92 percent to net sown area). The spatial distribution of pulses in Nashik district can be studied under three classes as below;

1) **Area having more than 10 percent land under pulses:** Map4.5 clearly shows that the major concentration of pulses (More than 10 percent) is found in three tahsils in the district. These
tahsils are viz, Surgana (20.29 Percent), Nandgaon (12.23 Percent) and Kalwan (10.39 percent).

2) **Land between 5 to 10 percent:** About 5 to 10 percent land under pulses is found in nine tahsils in the district. These tahsils are viz Nashik (9.48 %), Satana (8.54%), Chandwad (8.14 %), Peth (7.43 %), Niphad (7.2 %), Yeola (7.04 %), Igatpuri (6.8 %), Malegaon (5.82 %) and Sinner (5.44 %).

3) **Less than 5 percent area under pulses:** Less than 5 percent land under pulses was observed only in Dindori tahsil in the district (map4.5).

**4-B.5.4: Fodder**

Fodder is kharif as well as rabbi crop occupying 62186 hectares (7.41 percent to net sown area) and ranks fourth in the district. It can be used as food of the animals.

**Ecological condition:**

Fodder crops grown in different types of climatic conditions. It can be grown on all soil types. It’s per hectare yield is depends on soil types. The average annual rainfall between 100 to 700 mm is suitable for proper growth. The fodder crops are grown on a large scale in the district. They comprise grass, lasoon ghas, summer jawar etc. It is grown in maximum tahsil. The field preparation is similar to crops grown in kharif as well as rabbi seasons in the district.
Spatial Distribution:

The spatial distribution of fodder crops is shown in map 4.4. It is obvious that soil types do not correlate with distribution of fodder. Maximum percent (More than 20%) under fodder is found in Igatpuri and Peth tahsils; whereas minimum (less than 10 %) is in Nandgaon and Satana tahsils. The distribution of fodder can be studied as under;

1) Areas having more than 20 percent to net sown area: More than 20 percent land under fodder is observed in Igatpuri (27.74 %) and Peth (20.30%) in the district where the soil are neutral in reaction, contain higher amounts of organic matter and are low in their basic status.

2) Areas having 10 to 20 percent to net sown area: Nashik, Dindori and Kalwan have areas between 10 to 20 percent land under fodder to net sown area are confined to fertile soils producing high yield per hectare in these three tahsils. The tahsils namely Dindori (19.95 %), Nashik (17.79 %) and Kalwan (16.81 %) in the study area under review (Map 4.6).

3) Less than 10 percent land under fodder: The area under fodder crops having less than 10 percent to net sown area is found in eight tahsils namely Chandwad ( 5.62%), Surgana (5.1%), Sinner ( 4.3%), Niphad ( 2.2%0, Malegaon ( 1.65%), Yeola ( 0.98%), Satana ( 0.9%) and Nandgaon( 0.27 ) area under fodder to net sown area ( map 4.6).

4-B.5.5: Oil-Seeds

Groundnut, Sunflower, Sesumum, Caster and Khurasani etc oil-seeds are produced in the district. Of these, groundnut is an important cash crop produced extensively in the district. Next to
groundnut and khurasani, Sunflower and Sesamum assume third and fourth position in the field of oil-seeds production. The area under all oil-seeds was 50523 hectares in 2000-2010. Generally 6.02 percent of the total area under cultivation is under oil-seeds in the district.

**Ecological condition:**

Groundnut is mainly a kharif crop. However it is also grown as a Rabi crop if irrigation facilities are available. It is sown on light sandy soils, or on medium black.

Sesamum is grown on light sandy loams or light soils, usually as a kharif crop. It is either grown as a mixed or border crop or as a single crop. It is sown in June or July.

Sunflower is a Rabi crop and is grown on black cotton soils, loams and light alluvial soils. However, it is seldom grown as a pure crop. The crop is sown in October or November and is harvested in March-April.

Mustard is grown throughout the year in gardens or during the cold season around wheat or gram fields or mixed with wheat or linseed. The leaves and green pods are eaten as vegetable.

Niger is a kharif crop and is grown mostly under conditions of moderate rainfall not exceeding 40 inches. The peculiarity of the crop is that it requires no ploughing and no manuring. It is grown on light red and brown loam soils. The crop is generally sown in June or July and taken as a mixed crop mostly along with ragi and sometimes along with groundnut, castor or bajra.

**Spatial Distribution**

It is observed from map 4.7 that Nashik district has cultivated oil seeds everywhere in the district. The spatial distribution of oilseeds can be studied as under;
1) **Area having more than 10 percent to net sown area**: It is observed that more than 10 percent land under oilseeds occurs in the western part of the district (map4.7). The tahsils include namely Igatpuri (11.73 %), Surgana (11.48 %) and Peth (11.33 %).

2) **About 5 to 10 percent land under oilseeds**: About 5 to 10 percent land under oilseeds has observed in eastern and central part of the district. Maximum percentages of this category are observed at eastern part of Malegaon (8.71 percent to net sown area) and minimum at Niphad (6.24 percent to net sown area) in the central part of the district.

3) **Less than 5 percent**: Less than 5 percent land under oilseeds is found in Kalwan (4.13 %), Satana (3.48 %), Chandwad (3.4 %), Sinner (3.00 %) and Yeola (1.88 %) in the area under review (map4.7).

4-B.5.6: **Rice**

Rice is a kharif crop sown on 46536 hectares (5.54 percent) to net sown area of the district. It ranks sixth and grown to some extent almost all over the district, but mostly in Igatpuri, Peth and Surgana tahsils.

**Ecological Condition:**

Nashik district is famous for its superior varieties of rice such as *ambemohor* and *chimansal*. Rice is a kharif crop and generally grown on light and black soil. The temperature ranging between $20^\circ$ to $37^\circ$C is optimum for growth. It grows well in the areas where rainfall is between 1000 mm to 1100 mms.

The agricultural department has suggested *Halvi Kolpi 70*, *Garvikolpi 248* and *Bhadas 1303* as the improved strains for the district.
Spatial Distribution:

The spatial distribution of rice in the district is shown in map 5.6. This map reveals three distinct areas of rice distribution are as under;

1) **Area having more than 20 percent to net sown area:** The land more than 20 percent to net sown area under rice is found in the western part (i.e. Downghat Konkan) of the district, viz in the Igatpuri (33.56 %) and Peth (24.31 %) tahsils.

2) **About 10 to 20 percent land to net sown area:** It is found only in Surgana (17.6 %) tahsil.

3) **Less than 10 percent land under rice to net sown area:** The third category is less than 5 percent land to net sown area under rice found in nine tahsils to the eastern part except downghat konkan. The notable tahsils where rice is cultivated between 5 to 10 percent out to net sown area are viz. Dindori (8.47 %), Nashik (8.33 %), and Kalwan (6.47 %). While less than 5 percent area to net sown area are viz, Sinner (2.5 %), Satana (0.65 %), Chandwad (0.44 %), Niphad (0.31 %), Malegaon (0.06 %) and Yeola (0.03) (map 4.8).

4-B.5.7: Nachani

Nachani ranks seventh in Nashik district with 4.79 percent to net sown area (40220 hectares). The crop is grown in the high rainfall areas of Peth, Surgana and Igatpuri tahsils.

Ecological Condition:

Nachani is entirely a rain-fed crop, and is generally grown on too light soil and sloping lands. The crop is weeded once, and superfluous seedlings are thinned out. No further attention is required until the harvest time. The crop becomes ready for harvest by October or the beginning of November. The crop is
grown in the high rainfall areas of Peth, Surgana and Igatpuri tahsils.

**Spatial Distribution:**

The spatial distribution of nachini is shown in map 4.9. It is obvious that soil types do not correlate with distribution of nachani. Maximum percentages under nachani are found in Surgana to the north-western part of the district, whereas minimum percentages are found in Igatpuri to the south-western part of the district. The distribution of nachani can be studied as under;

1) **Area having more than 30 percent to net sown area:** It is observed that more than 30 percent land under nachani occurs in north-western part of the district, viz. in Surgana (40.08 %) and Peth (33.4 %) tahsils.

2) **About 15 to 30 percent land under nachani:** 15 to 30 percent land under nachani has observed only in Dindori (18.69 %) tahsil.

3) **Less than 15 percent hectare:** Less than 15 percent land under nachani is found in Igatpuri tahsil (13.02 %) in the district (map4.9).

**4-B.5.8: Wheat**

Wheat is Rabi crop in Nashik district. It accounts 4.64 percent to net sown area (38945 hectares) in all tahsils of the district. Wheat ranks eighths in the district. It can be used for many purposes such as bread-making, chapatti and in different forms of food.
Nashik District: Distribution of Crops

Map 4.9: Nachani

Map 4.10: Wheat
Ecological condition:

Wheat grows in varying climatic conditions but it does thrive well under cool, dry and clear weather. It requires cool weather in early stage for proper tillering. Dry, sunny days and cool nights are helpful. Moreover, long duration of day and short nights are essential for optimum growth of plants. Temperature ranging from $7^0\text{C}$ to $21^0\text{C}$ finds better for wheat.

Wheat is a Rabi crop, sown in October and harvested in March. The irrigated crop is grown on medium or black soil which is moisture-retentive. The crop takes about five months to mature and is ready for harvesting from the middle of February to the end of March.

Spatial Distribution:

Wheat is grown in all tahsils in the district (map4.10). Most of the area under wheat is found in Nashik tahsil (14.25 percent to net sown area) and less is in Nandgaon (0.15 percent to net sown area). It is noticed that area under wheat is not extensive in each tahsils due to the different physical condition. The distribution of wheat can be studied under following categories;

1) The area of wheat more than 10 percent land to net sown area: The major concentration of wheat is found in Nashik and Dindori tahsils. This tahsils has more than 10 percent land to net sown area under this crop (map4.10). Two tahsils have observed more than 10 percent to net sown area in this category. These tahsils are viz. Nashik (14.25 %) and Dindori (13.67%).

2) About 5 to 10 percent land under wheat: About 5 to 10 percent land under wheat is found in two tahsils namely, Kalwan (7.89%) and Niphad (6.65%).

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3) **Less than 5 percent area to net sown area:** Less than 5 percent land to net sown area under wheat is found in nine tahsils of the district. The notable tahsils where wheat is cultivated less than 5 percent to the net sown area are viz. Sinner (3.89 %), Satana (3.96%), Yeola (3.94 %), Chandwad (3.19%), Igatpuri (3.05%), Peth (2.3 %), Malegaon (2.23 %), Surgana (1.04%) and Nandgaon (0.15 %) in the area under review.

**4-B.5.9: Jawar**

Jawar is staple crop provides food to human and fodder to livestock’s. It is growned on 30860 hectares (Kharif and Rabi) throughout the district. Jawar is mainly cultivated for local consumption.

**Ecological Condition:**

Jawar is essentially a tropical crop grown in both kharif and Rabi seasons. It thrives better under the condition of high temperature of 270 C. It requires average annual rainfall between 600 to 1000mm. Jawar is drought resistant, remains dormant during the period of drought and starts active growth when the moisture in soil improve. Jawar thrives well in medium black to heavy soils. Kharif jawar is produced between June and December while Rabi jawar is produced between September and February.

**Spatial Distribution:**

The spatial distribution of jawar is largely controlled by average annual rainfall, soil types and altitude of the farmers of the district. Increasing awareness among farmers to adopt new varieties of crops for sowing has changed the cropping pattern of jawar and hence the major concentration of this crop is mostly
confined to Dindori and Yeola tahsils in the district. The main features of spatial distribution of jawar are as below;

1) The area of Jawar more than 10 percent land to net sown area: The major concentration of jawar is found in Dindori tahsil. This tahsil has more than 10 percent (11.39 %) land to net sown area under this crop (map4.11).

2) 5 to 10 percent land to net sown area: About 5 to 10 percent land under jawar is found only in Yeola (6.69 %) tahsil in the district.

3) Less than 5 percent area to net sown area: The third category of less than 5 percent land to net sown area under jawar is found in eleven tahsils of the district. The notable tahsils where jawar is cultivated less than 5 percent to net sown area is viz. in Niphad ( 4.36 % ), Chandwad ( 4.13 % ), Surgana ( 3.86 % ), Kalwan ( 3.55 % ), Nandgaon ( 2.85 % ), Malegaon ( 2.45 % ), Peth ( 2.24 % ), Satana ( 1.89 % ), Sinner ( 1.83 % ), Igatpuri ( 1.4 % ) and Nashik ( 1.06 % ) tahsil in the area under study.

4-B.5.10: Sugarcane

Sugarcane is one of the important cash crops of the district. Sugarcane ranks tenth in the district. It accounts for 3.45 percent to net sown area (28967 hectares). This crop is cultivated in ten tahsils of the district.

Ecological Condition:

Sugarcane is a tropical crop and for high outturns moist hot climate and ample supply of water are necessary. It is entirely an irrigated crop. The crop is grown on heavy black and well-drained soils. The planting is done either in January, July or in October.
Nashik District: Distribution of Crops

Map 4.11: Jawar

Legend

- < 5
- 5 to 10
- > 10

Map 4.12: Sugarcane

Legend

- < 5
- 5 to 10
- > 10

Km
Mostly the plantation of sugarcane seen in the month of July locally known as “adsali lagan”.

Spatial Distribution:

Sugarcane is successfully grown in the district except the western hilly part (map 4.12). It is entirely an irrigated crop. The crop is grown on heavy black and well-drained soils. The spatial distribution of sugarcane is shown in map 4.12. It is from map 4.12 that this crop is found in three categories as under;

1) **Areas having more than 10 percent land under sugarcane:**
   
   The major concentration of sugarcane is found in Niphad tahsil. This tahsil has more than 10 percent land (18.08 %) to net sown area under this crop (map 4.12). This tahsils is well developed for cannel irrigation and well irrigation.

2) **Land between 5 to 10 percent:** About 5 to 10 percent land under sugarcane is found in Dindori tahsil (7.27 % to net sown area).

3) **Less than 5 percent area under sugarcane:** The third category of less than 5 percent land to net sown area under sugarcane is found in eight tahsils in the district. The tahsils where sugarcane is cultivated less than 5 percent out to net sown area are viz. Satana (3.99 %), Kalwan (3.79 %), Nashik (3.15 %), Nandgaon (1.81%), Sinner 9 1.75 %, Yeola (0.93 %), Malegaon (0.76 %) and Chandwad (0.61 %) in the district.

4-B.5.11: Fruits

Grapes, pomegranate, guava, mango, lemon, papaya, banana etc. are grown in the district. These grapes and pomegranates are important and are grown widely in the district. Besides other fruits are also grown but to a very limited extent.
Total fruits ranks eleventh in the district. It accounts for 26897 hectares (3.2 %) to the net sown area.

**Ecological Condition:**

Grapes are grown well in dry climate with sharp but short winters and long dry summers. Lighter types of soils with good drainage are the best for the crop. Grapes are planted from the cutting of mature grape vines. Cuttings from October pruning are selected and are then planted in nursery. The cuttings are joint up to second joint and watered every day till they are established. Grape cultivation requires intensive work and higher investment than other agricultural crops. The grapes become transparent by February and are ready for harvest by March. Grapes should be plucked only when they are ripe. Within 14 months of its plantation grapes start bearing. However it bears a full crop only from third year. Harvesting is done twice, i.e., in April and in October.

Mango trees grow well on deep heavy soils with good drainage. Good varieties of mangos are usually propagated by grafts. Mango plantation generally requires no aftercare such as watering etc. after 4 to 5 years, as the roots penetrate deep into the soil. The mango tree bears fruit after five years of its plantation.

Guava is grown on a variety of soils, viz. alluvial, bhata soils, black soils and black reddish soils. Guava is propagated from seeds. However for quality fruits grafts from selected trees are used. Guava plantation from lasts 12-20 years. However the soil and the care bestowed upon it also determine its life.
Papaya suits any type of soil. However humid and warm climate is most suitable. The crop reacts adversely to frosty climate and it requires very well-drained soil.

**Spatial Distribution:**

The spatial distribution of total fruits in the district is shown in map4.13. The trend of the fruit cultivation is going on increase in the farmers. Map4.13 reveals three distinct areas of fruits distribution are as under;

1) **Area having more than 10 percent to net sown area:** The land more than 10 percent to net sown area under fruits is found in Nashik (11.48 %) and Niphad (10.7 %) tahsils in the district (map4.13).

2) **About 5 to 10 percent fruit to net sown area:** About 5 to 10 percent land under fruits observed only in one tahsil viz, Satana.

3) **Less than 5 percent is under fruits to net sown area:** The third area of having less than 5 percent is under fruits to net sown area is found in seven tahsils in the district viz, Malegaon (4.46 %), Dindori (2.86 %), Chandwad (2.71 %), Kalwan (0.89 %), Sinner (0.8 %), Yeola (0.56 %) and Nandgaon (0.44 %).

**4-B.5.12: Maize**

Maize is staple crop and provides food to human and fodder to livestock. This improved variety of seeds are producing high yield per hectares. Maiz ranks 12th in the district and accounts an area of 20159 hectares (2.4 %) to the net sown area in the district.
Ecological Condition:

Maize is a tropical crop grown in both kharif and Rabi seasons. It thrives better under the condition of high temperature of 27°C. It requires average annual rainfall between 600 to 1000mm. Maize is drought resistant and remains dormant during the period of drought and starts active growth when the moisture in soil improve. Maize thrives well in medium black to heavy soils. Kharif Maize is produced between June and December while Rabi maize is produced between September and February.

Spatial Distribution:

Maize is successfully grown in the north eastern part of the district (map4.14). The improved seeds of this crop assured high yield per hectares. The medium to deep black soil in the district is also useful to widespread of this crop and hence the spatial distribution and its areal extent are confined by these factors. The spatial distribution of maize is shown in map4.14. The main features of spatial distribution of maize are as below;

1) The area of maize more than 10 percent land to net sown: It is observed that more than 10 percent land to net sown area has concentrated in Kalwan tahsil (12.75 percent to net sown area).

2) 5 to 10 percent land under maize to net sown area: About 5 to 10 percent land to net sown area is found only in one tahsil, i.e. Satana (8.88 %) in the district.

3) Maize having less than 5 percent area to net sown area: Less than 5 percent land under maize was observed in four tahsils, viz. Yeola (4.37%), Malegaon (3.85%, Nandgaon (0.87%) and Chandwad (0.1%) in the district.
4-B.5.13: Other Crops

Other crops include Vari, Ragi, Cotton, Ambadi, Sann, Chilies, Garlic and Coriander (Dhane). Insignificant hectarage are under this category (4.34 percent to net sown area) occupying 36452 hectare area of the district.

Ecological Condition and Farm Operation:

The above mentioned crops can grow in varied climatic conditions and soil types. Generally, these crops are cultivated in kharif as well as rabi seasons. The field preparation is similar to crops grown in kharif as well as rabi season in the district.

Spatial Distribution:

It is observed that more than 4 percent land under other crops found only in Nandgaon (4.37%) tahsil. About 2 to 4 percent land under other crops has observed in five tahsils, viz. Kalwan(3.41%), Yeola(3.17%), Nashik(2.82%), Niphad(2.77%) and Malegaon(2.49%) while less than 2 percent land under other crops is found in seven tahsils, viz. Dindori(1.49%), Satana(1.03%), Sinner(0.74%), Surgana(0.67%), Chandwad(0.61%), Igatpuri (0.37%) and Peth (0.01%) in the area under study.