INTERPRETATION OF FOREST AND NON FOREST COVER IN KANDI REGION OF PUNJAB

Punjab Forest Department assigned the project of the mapping of forest and non forest areas in the Kandi region of Punjab to the Punjab Remote Sensing Centre (PRSC), Ludhiana based on satellite data with date of pass as close as possible to 25th October, 1980. The digital classification and mapping of Forest and non forest areas in SAS Nagar, Rupnagar, SBS Nagar, Hoshiarpur and Pathankot districts falling in the Shiwalik area was undertaken using LANDSAT data of 22nd and 23rd October, 1980. The interpretation of study area under forest and non forest cover was carried out district wise.

OBJECTIVE

The key objective of the project was generation of Forest and Non Forest Map of districts SAS Nagar, Rupnagar, Saheed Bhagat Singh Nagar (SBS Nagar), Hoshiarpur and Pathankot using the geo-referenced digital LANDSAT 1980 Satellite data.
DISTRICT SAS NAGAR

GENERAL DESCRIPTION

LOCATION

The SAS Nagar district was carved out by merging Kharar tehsil of Rupnagar district and Dera Bassi tehsil of Patiala district in 2006. It is located between 30° 22' & 30° 56' N latitude 76° 31' & 76° 51' E longitude covering an area of 109300 ha. The SAS Nagar district is covered by topographical sheet 53 B on 1:250,000 and 53B/9, 53B/10, 53B/11, 53B/13, 53B/14 and 53B/15 on 1:50,000 scale. It is bounded by Chandigarh and parts of Himachal Pradesh and Haryana state in the east, Rupnagar in the north-east and Patiala and Shri Fatehgarh Sahib districts in west with parts of Haryana state on the Southern part.

DRAINAGE AND CANAL NETWORK

The terrain of S.A.S. Nagar is plain as well as partly hilly with moderate to gentle slope.

Ghaggar river, Budki Nadi, Siswan Nadi, Dugli Nadi, Jainti Devi Ki Rao, Patiala Ki Rao, Tangauri choe forms the drainage system of the area. There is only one canal passing through the district namely Bhakra canal.

INPUT DATA (Satellite data Used)

LANDSAT-3 data with 80 mts. spatial resolution in Geo-tiff format was downloaded from USGS archive (U.S. Geological SurveyLEVEL-1 PRODUCT). As per CDINFO file the details are as follows:

<table>
<thead>
<tr>
<th>Sensor</th>
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<tbody>
<tr>
<td>MSS</td>
<td>22-10-1980</td>
<td>158/39</td>
</tr>
</tbody>
</table>

The same was used to interpret the Forest and non forest classes.
METHODOLOGY

The LANDSAT-3 satellite data of 22 October, 1980 was used for the study. LANDSAT-3 data with 80 mts. spatial resolution in Geo-tiff format was downloaded from USGS archive (U.S. Geological Survey LEVEL-1 PRODUCT). Geo-referencing of the satellite data was undertaken with respect to scanned and geo-referenced Survey of India (SOI) toposheets of 1:50,000 scale and geo-referenced satellite data available with PRSC using Map Registration Technique. After georeferencing digital interpretation of satellite data was carried out. Digital image processing (DIP) technique offers a more objective assessment of forest cover at a larger scale and better cartographic presentation, thus overcoming the limitations of visual interpretation to a large extent. In the present study, the methodology of interpretation involves a hybrid approach in which unsupervised classification (ISODATA algorithm) aided by on-screen visual interpretation of forest and non forest cover was undertaken.

Unsupervised classification was attempted to delineate different land use classes in the study area. The assessment of the forest and non forest cover in the study area was carried out by using unsupervised classification aided with visual interpretation of LANDSAT imagery using Image processing and GIS software. Area under forests and non-forests has been calculated on the basis interpretation of satellite data. The non forest category includes agricultural land, land with scrub, barren area, built-up land, river, etc.

RESULTS

In the present study, the area under forests and non-forests for 1980 has been interpreted on the basis of LANDSAT satellite data downloaded from USGS site pertaining to 22 October, 1980. The areas under forests and non forests were demarcated on the basis of interpretation of satellite data. The non forest includes agricultural land, wasteland, barren area, built-up land, river, etc.
District SAS Nagar includes some parts of Shiwalik foot hills which have moderate to dense forest cover. The study reveals that out of 1093 sq. km total geographical area of District, 96603.42 ha was under different non forest categories. On the basis of the LANDSAT data, a total of 12672.42 ha area of the district was found to be under forest cover mainly located in the Shiwalik foot hills. This comes out to be 11.60 per cent of the total geographical area of the district.
<table>
<thead>
<tr>
<th>Category</th>
<th>Area in Sq.km</th>
<th>Area in %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forest</td>
<td>127</td>
<td>11.62</td>
</tr>
<tr>
<td>Non Forest</td>
<td>966</td>
<td>88.38</td>
</tr>
<tr>
<td>TGA of District</td>
<td>1093</td>
<td>100</td>
</tr>
</tbody>
</table>

It has been observed that the forest was mainly located in the hilly region and undulating area, whereas the plain area is under intensive agriculture. There were some areas under tree crop in the plains and along the seasonal rivulets passing through the district. It was also observed that density was very low (open and scrub forest) in many parts of the forest. The areas under forests in each individual polygon were also calculated. The study reveals that there are different polygons/blocks of forests varying from .02 ha to 4637 ha in the district (Table 2). The co-ordinates of vertices of each and every polygon are also marked on the maps and same has been depicted in Table, 3). The forest area as polygons can be demarcated on the ground using GPS.

The SAS Nagar district was divided in 5’x5’ grid and a total of 34 grids were formed. Across the grids total area under forest cover ranged between 4.98 and 3371.95 ha minimum in grid number 53B10/7 and maximum in grid number 53B13/2. There were few grids in which there is no forest.
DISTRICT RUPNAGAR

GENERAL DESCRIPTION

LOCATION

Rupnagar district is the part of the Kandi belt and lies between latitude of $30^\circ 44'$ & $31^\circ 26'$ N and longitude of $76^\circ 17'$ & $76^\circ 44'$ E, it covering an area of 1395 sq. km. The Rupnagar district is covered by topographical sheet 53B and 53A on 1:250000 and 53A/07, 53A/08, 53A/11, 53A/12, 53B/05 and 53B/09 on 1:50,000 scale. The SBS Nagar and Ludhiana districts lie in the west, Fatehgarh Sahib and SAS Nagar district in the south and south-east, Una district of Himachal Pradesh in the north and Panchkula district of Haryana in the north-east.

DRAINAGE AND CANAL NETWORK

The river Satluj forms the main drainage system in the area and flows in general from north-east towards west. The tract is dissected by Sugh Rao and Budki nadi. There are numerous ‘choes’ which join the river Satluj are mostly seasonal. Most of the streams in the hilly tract have a narrow George and a fairly long length of flow. There are three main canals passing through the Rupnagar, namely Bist Doab, Sirhind canal and Bhakra. While the Bist Doab and Sirhind canals extract water from Ropar Head works, the Bhakra canal originating at Nangal is fed from the Govind Sagar Lake. The SYL (not in operation) also pass through the study area.

GEOMORPHOLOGY

Sizeable area of the district is comprised of Siwalik Hills. The three important geomorphologic processes prevalent in the area are erosion, deposition and fluviatile action of choes and river Satluj. Erosion of the sediments from the hills and their deposition in the piedmont plain results in modification of the original landforms in the area. The fluviatile sedimentation pattern seems to be strongly influenced by relief and climate. Previously, the area used to be flooded by river Satluj, but now it has been checked by construction of Bhakra Dam; barrage at Nangal and embankments along the course of Satluj river.
**CLIMATE**

The study area falls under semi-arid (sub-moist) and less hot zone of Punjab. The area experiences two wet periods (Mid December to Mid-February and Mid June to Mid-September). The mean annual rainfall in the district is about 627 mm and major portion of it is received during the monsoon season with few showers during winter season.

**INPUT DATA (SATELLITE DATA USED)**

LANDSAT-3 data with 80 mts. spatial resolution in Geo-tiff format was downloaded from USGS archive (U.S. Geological SurveyLEVEL-1 PRODUCT). As per CDINFO file the details are as follows:

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<tr>
<td>MSS</td>
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</tr>
</tbody>
</table>

The same was used to interpret the Forest and non-forest classes.

**METHODOLOGY**

The LANDSAT-3 satellite data of 22 October, 1980 was used for the study. LANDSAT-3 data with 80 mts. spatial resolution in Geo-tiff format was downloaded from USGS archive (U.S. Geological SurveyLEVEL-1 PRODUCT). Geo-referencing of the satellite data was undertaken with respect to scanned and geo-referenced Survey of India (SOI) toposheets of 1:50,000 scale and geo-referenced satellite data available with PRSC using Map Registration Technique. After georeferencing digital interpretation of satellite data was carried out.

Digital image processing (DIP) technique offers a more objective assessment of forest cover at a larger scale and better cartographic presentation, thus overcoming the limitations of visual interpretation to a large extent. In the present study, the methodology of interpretation involves a hybrid approach in which unsupervised classification (ISODATA algorithm) aided by on-screen visual interpretation of forest and non-forest cover was undertaken.

Unsupervised classification was attempted to delineate different land use classes in the study area. The assessment of the forest and non-forest cover in the study area was carried out by using unsupervised classification aided with visual interpretation of LANDSAT imagery using Image processing and GIS software. Area under forests and non-forests has been calculated on the basis interpretation of satellite data. The non-forest category includes agricultural land, land with scrub, barren area, built-up land, river, etc.
RESULTS

In the present study, the area under forests and non-forests for 1980 has been interpreted on the basis of LANDSAT satellite data downloaded from USGS site pertaining to 23 October, 1980. The areas under forests and non-forests were demarcated on the basis of interpretation of satellite data. The non-forest includes agricultural land, wasteland, barren area, built-up land, river, etc.
District Rupnagar includes some parts of Siwalik foot hills which have moderate to dense forest cover. The study reveals that out of 1395.69 sq.km total geographical area of District, 1173.37 sq.km was under different non-forest categories. On the basis of the LANDSAT data, a total of 222.32 sq.km area of the district was found to be under forest cover mainly located in the Siwalik foot hills. This comes out to be 11.60 per cent of the total geographical area of the district.

<table>
<thead>
<tr>
<th>Category</th>
<th>Area in Sq.km</th>
<th>Area in %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forest</td>
<td>222.32</td>
<td>15.93</td>
</tr>
<tr>
<td>Non Forest</td>
<td>1173.37</td>
<td>84.07</td>
</tr>
<tr>
<td>TGA of District</td>
<td><strong>1395.69</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

It has been observed that the forest was mainly located in the hilly region and undulating area, whereas the plain area is under intensive agriculture. There were some areas under tree crop in the plains and along the seasonal rivulets passing through the district. It was also observed that density was very low (open and scrub forest) in many parts of the forest. The areas under forests in each individual polygon were also calculated. The Rupnagar district was divided in 5’x5’ grid and a total of 38 grids were formed at the scale of 10,000. The grid include with forest non forest area matrix.
DISTRICT SBS NAGAR

GENERAL DESCRIPTION

LOCATION

District SBS Nagar is located between the latitude of 30° 58’ N & 31° 14’ N and longitude of 75° 47’ E & 76° 31’ E. This is the third smallest district of Punjab after SAS Nagar and Fatehgarh Sahib. The area covered by this district is only 1259.61 sq.km. The SBS Nagar district is covered by topographical sheet 53B, 44M, 53A, on 1:250000 and 44M/16, 53A/04, 53A/08, 53A/12, 53B/01, 53B/05 and 53B/09 on 1:50,000 scale.

DRAINAGE AND CANAL NETWORK

Satluj River is the main drainage channel which transverse the district SBS Nagar along its southern boundary. The area is also drained by a number of choes. The most parts of the year these seasonal streams do not carry any water and it discharge is full especially in monsoon season.

CLIMATE

The most significant climatic element involved in shaping the region in the present form is temperature and rainfall. The meteorological station present in SBS Nagar district is at Ballowal Saunkri. The month of June is the hottest with temperature reaching 33.4°C and January is coolest with lowest temperature at 12.3°C. The average rainfall of the district is 600 mm.

INPUT DATA (Satellite data Used)

LANDSAT-3 data with 80 mts. spatial resolution in Geo-tiff format was downloaded from USGS archive (U.S. Geological SurveyLEVEL-1 PRODUCT). As per CDINFO file the details are as follows:

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<tbody>
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</tr>
</tbody>
</table>

The same was used to interpret the Forest and non-forest classes.
METHODOLOGY

The LANDSAT-3 satellite data of 22 October, 1980 was used for the study. LANDSAT-3 data with 80 mts. spatial resolution in Geo-tiff format was downloaded from USGS archive (U.S. Geological Survey LEVEL-1 PRODUCT). Geo-referencing of the satellite data was undertaken with respect to scanned and geo-referenced Survey of India (SOI) topsheets of 1:50,000 scale and geo-referenced satellite data available with PRSC using Map Registration Technique. After georefencing digital interpretation of satellite data was carried out. Digital image processing (DIP) technique offers a more objective assessment of forest cover at a larger scale and better cartographic presentation, thus overcoming the limitations of visual interpretation to a large extent. In the present study, the methodology of interpretation involves a hybrid approach in which unsupervised classification (ISODATA algorithm) aided by on-screen visual interpretation of forest and non-forest cover was undertaken.

Unsupervised classification was attempted to delineate different land use classes in the study area. The assessment of the forest and non-forest cover in the study area was carried out by using unsupervised classification aided with visual interpretation of LANDSAT imagery using Image processing and GIS software. Area under forests and non-forests has been calculated on the basis interpretation of satellite data. The non-forest category includes agricultural land, land with scrub, barren area, built-up land, river, etc.

RESULTS

In the present study, the area under forests and non-forests for 1980 has been interpreted on the basis of LANDSAT satellite data downloaded from USGS site pertaining to 23 October, 1980. The areas under forests and non-forests were demarcated on the basis of interpretation of satellite data. The non-forest includes agricultural land, wasteland, barren area, built-up land, river, etc.

District SBS Nagar includes some parts of Siwalik foot hills which have moderate to dense forest cover. The study reveals that out of 1259.61 sq. km total geographical area of District, 1137.51 sq.km was under different non forest categories. On the basis of the LANDSAT data, a total of 122.10 sq.km area of the district was found to be under forest cover mainly located in the Siwalik foot hills. This comes out to be 11.60 per cent of the total geographical area of the district.
<table>
<thead>
<tr>
<th>Category</th>
<th>Area in Sq.km</th>
<th>Area in %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forest</td>
<td>122.10</td>
<td>9.69 %</td>
</tr>
<tr>
<td>Non Forest</td>
<td>1137.51</td>
<td>90.31 %</td>
</tr>
<tr>
<td>TGA of District</td>
<td>1259.61</td>
<td>100</td>
</tr>
</tbody>
</table>

It has been observed that the forest was mainly located in the hilly region and undulating area, whereas the plain area is under intensive agriculture. There were some areas under tree crop in the plains and along the seasonal rivulets passing through the district. It was also observed that density was very low (open and scrub forest) in many parts of the forest. The areas under forests in each individual polygon were also calculated. The SBS Nagar district was divided in 5’x5’ grid and a total of 35 grids were formed at the scale of 10,000. The grid include with forest non forest area matrix.
DISTRICT HOSHIARPUR

GENERAL DESCRIPTION

LOCATION

Hoshiarpur district lying in the north-east of Punjab state, form a part of Bist Doab plain. It falls in the Jalandhar Revenue Division. The district lies between the latitudes of 31° 07’ 58” and 32° 05’ 13” N and longitudes 75° 28’ 25” & 76° 20’ 58” E. It covers an area of 3398.32 sq. km. It is bound by Himachal Pradesh in the east and north-eastern side, Gurdaspur district in the north-west, Kapurthala and Jalandhar districts in the south-west and SBS Nagar district in the south. It shares common boundary with Kangra and Una districts of Himachal Pardesh in the north east. The Hoshiarpur district is covered on 1:50,000 Grid( 44P/12, 44P/16, 44M/9, 44M/10, 44M/11, 44M/13, 44M/14, 44M/15, 44M/16, 53A/2, 53A/3, 53A/4, 53A/7 and 53A/8)

DRAINAGE AND CANAL NETWORK

The district is drained by the numbers of `choes' and the Beas River on the north-western side. The Hoshiarpur district comprises of two nearly equal portions of hills and plain area. The Kandi area comprising of hills and piedmont plain is rain fed. There are three canals (Shah, Shahpur and Kandi canals) providing water for irrigation.

CLIMATE

The district has mild climate compared to other districts of the State. This is due to the presence of hilly terrain with sizeable forest cover. The number of check dams, constructed recently on the choes under "Kandi Watershed Development Project" have appreciably enhanced water recharge and vegetation cover close to the check dams.

INPUT DATA (Satellite data Used)

LANDSAT-3 data with 80 mts. spatial resolution in Geo-tiff format was downloaded from USGS archive (U.S. Geological SurveyLEVEL-1 PRODUCT). As per CDINFO file the details are as follows:
The LANDSAT-3 satellite data of 22 October, 1980 was used for the study. LANDSAT-3 data with 80 mts. spatial resolution in Geo-tiff format was downloaded from USGS archive (U.S. Geological Survey LEVEL-1 PRODUCT). Geo-referencing of the satellite data was undertaken with respect to scanned and geo-referenced Survey of India (SOI) toposheets of 1:50,000 scale and geo-referenced satellite data available with PRSC using Map Registration Technique. After georeferencing digital interpretation of satellite data was carried out. Digital image processing (DIP) technique offers a more objective assessment of forest cover at a larger scale and better cartographic presentation, thus overcoming the limitations of visual interpretation to a large extent. In the present study, the methodology of interpretation involves a hybrid approach in which unsupervised classification (ISODATA algorithm) aided by on-screen visual interpretation of forest and non-forest cover was undertaken.

Unsupervised classification was attempted to delineate different land use classes in the study area. The assessment of the forest and non-forest cover in the study area was carried out by using unsupervised classification aided with visual interpretation of LANDSAT imagery using Image processing and GIS software. Area under forests and non-forests has been calculated on the basis interpretation of satellite data. The non-forest category includes agricultural land, land with scrub, barren area, built-up land, river, etc.

RESULTS

In the present study, the area under forests and non-forests for 1980 has been interpreted on the basis of LANDSAT satellite data downloaded from USGS site pertaining to 22 October, 1980. The areas under forests and non-forests were demarcated on the basis of interpretation of satellite data. The non-forest includes agricultural land, wasteland, barren area, built-up land, river, etc.

District Hoshiarpur includes some parts of Shiwalik foot hills which have moderate to dense forest cover. The study reveals that out of 3398.31 sq.km total geographical area of District, 2774.60 sq.km was under different non forest categories. On the basis of the LANDSAT data, a total of 623.71 sq.km area of the district was found to be under forest cover mainly located in the
Shiwalik foot hills. This comes out to be 18.33 per cent of the total geographical area of the district.
<table>
<thead>
<tr>
<th>Category</th>
<th>Area in Sq.km</th>
<th>Area in %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forest</td>
<td>623.71</td>
<td>18.35 %</td>
</tr>
<tr>
<td>Non Forest</td>
<td>2774.60</td>
<td>81.65 %</td>
</tr>
<tr>
<td>TGA of District</td>
<td>3398.31</td>
<td>100</td>
</tr>
</tbody>
</table>

It has been observed that the forest was mainly located in the hilly region and undulating area, whereas the plain area is under intensive agriculture. There were some areas under tree crop in the plains and along the seasonal rivulets passing through the district. It was also observed that forest density was high and in many parts of the forest are open forest. The areas under forests in each individual polygon were also calculated. The Hoshiarpur district was divided in 5’x5’ grid and a total of 72 grids were formed at the scale of 10,000. The grid include with forest non forest area matrix.
DISTRICT PATHANKOT

GENERAL DESCRIPTION

LOCATION
Pathankot district is situated in the north-eastern part of Punjab state. It is bounded by Jammu and Kashmir and Pakistan in North West and Himachal Pradesh in north east. In the south and south-western side Gurdaspur districts and in eastern side Hoshiarpur district of Punjab State bounds in the study area. It lies between Latitude 32° 16' 40" N to 32° 21' 21" N and Longitude 75° 31' 15" E to 75° 46' 56" E. The Pathankot district is covered by topographical sheet 43 P on 1:250,000 and 43P/7, 43P/8, 43P/11, 43P/12, 43P/14 and 43P/15 on 1:50,000 scale.

DRAINAGE AND CANAL NETWORK
The Beas and the Ravi are the two rivers of the district and Upper Bari Doab Canal system which irrigates the most parts of the district. The Ravi River flowing along north and north-western part of the district are the major perennial rivers of the district. The north-eastern part of the district is also drained by Chakki River that meets Beas River near Mirthal. In Pathankot district Ravi River emerges from the foot hills at Shahpur Kandi and flows along the western boundary of the district registering Indo-Pak international boundary.

CLIMATE
Pathankot district enjoys semi-arid (semi-moist and moist) type of climate characterized by extreme summer and near freezing winters with large seasonal as well as monthly fluctuation in both temperature and rainfall. In general, summers are hot and winters are cool. The summer season starts from the end of March and continue till the end of June. Rainfall in the Pathankot district is uncertain and erratic. The monsoon generally starts late June; sometimes there are heavy rains and cause floods. The south-eastern monsoon brings rain from July to September.
INPUT DATA (Satellite data Used)

LANDSAT-3 data with 80 mts. spatial resolution in Geo-tiff format was downloaded from USGS archive (U.S. Geological SurveyLEVEL-1 PRODUCT). As per CDINFO file the details are as follows:

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<td>MSS</td>
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<td>160/37</td>
</tr>
<tr>
<td>MSS</td>
<td>24-10-1980</td>
<td>160/38</td>
</tr>
</tbody>
</table>

The same was used to interpret the Forest and non-forest classes.

METHODOLOGY

The LANDSAT-3 satellite data of 23 October, 1980 and 24 October, 1980 was used for the study. LANDSAT-3 data with 80 mts. spatial resolution in Geo-tiff format was downloaded from USGS archive (U.S. Geological SurveyLEVEL-1 PRODUCT). The Geo-referencing of the satellite data was undertaken with respect to scanned and geo-referenced Survey of India (SOI) toposheets of 1:50,000 scale and geo-referenced satellite data available with PRSC using Map Registration Technique. After georefencing digital interpretation of satellite data was carried out.

Digital image processing (DIP) technique offers a more objective assessment of forest cover at a larger scale and better cartographic presentation, thus overcoming the limitations of visual interpretation to a large extent. In the present study, the methodology of interpretation involves a hybrid approach in which unsupervised classification (ISODATA algorithm) aided by on-screen visual interpretation of forest and non-forest cover was undertaken.

Unsupervised classification was attempted to delineate different land use classes in the study area. The assessment of the forest and non-forest cover in the study area was carried out by using unsupervised classification aided with visual interpretation of LANDSAT imagery using Image processing and GIS software. Area under forests and non-forests has been calculated on the basis interpretation of satellite data. The non-forest category includes agricultural land, land with scrub, barren area, built-up land, river, etc.
RESULTS

In the present study, the area under forests and non-forests for 1980 has been interpreted on the basis of LANDSAT satellite data downloaded from USGS site pertaining to 23 October, 1980 and 24 October, 1980. The areas under forests and non-forests were demarcated on the basis of interpretation of satellite data. The non-forest includes agricultural land, wasteland, barren area, built-up land, river, etc.
District Pathankot includes some parts of Siwalik foot hills which have moderate to dense forest cover. The study reveals that out of 950.41 sq.km total geographical area of District, 806.12 sq.km was under different non forest categories. On the basis of the LANDSAT data, a total of 144.29 sq.km area of the district was found to be under forest cover mainly located in the Siwalik foot hills. This comes out to be 15.18 per cent of the total geographical area of the district.

<table>
<thead>
<tr>
<th>Category</th>
<th>Area in Sq.km</th>
<th>Area in %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forest</td>
<td>144.29</td>
<td>15.18 %</td>
</tr>
<tr>
<td>Non Forest</td>
<td>806.12</td>
<td>84.82 %</td>
</tr>
<tr>
<td>TGA of District</td>
<td>950.41</td>
<td>100</td>
</tr>
</tbody>
</table>

It has been observed that the forest was mainly located in the hilly region and undulating area, whereas the plain area is under intensive agriculture. There were some areas under tree crop in the plains and along the seasonal rivulets passing through the district. It was also observed that density was very low in lower part of forest area (open and scrub forest) where in many northern parts of the district carry very high forest density. The areas under forests in each individual polygon were also calculated. The Pathankot district was divided in 5’x5’ grid and a total of 32 grids were formed at the scale of 10,000. The each grid of District use to calculate the forest non forest area.

**LIMITATIONS**

The present study was supposed to be carried out using satellite data as close as possible to 25th October, 1980. Therefore, archived data was browsed and the relevant available data (LANDSAT-3 data with 80 mts. spatial resolution in Geo-tiff format) from USGS archive (U.S. Geological SurveyLEVEL-1 PRODUCT) was downloaded. LANDSAT- 3 data available for the present study have very coarse resolution (80mts.) and the ground verification could not be done as data pertains to 1980. Due to coarse resolution, it was not possible to demarcate areas under strip forests mainly along the roads and canals. It is worth monitoring that due to coarse resolution, there is likelihood of merging of adjoining classes to minor extent i.e. forest being classified as non-forest or vice-versa, especially at the boundary of the forest and non-forest areas.