CHAPTER - V

LAND EVALUATION OF
THE KURNOOL DISTRICT
Land embraces the atmosphere, the soils and underlying geology, the hydrology and the plants, above and below the specific area of the earth surface. It includes the results of the past and present human activities. The planning development and the adjustment of land is usually carried out in a number of successive phases namely land evaluation, socio-economic analysis, classifications and programme effectuation. Land evaluation includes both quantitative and qualitative classification. In developing countries like India where agriculture is the main economic activity the basic resources namely the land and water have to be properly augmented for better planning and development. Appraisal of resources and diagnosis of problems involved in management of resources availability is
particularly important in the areas of scarce resources. It has assumed greater acceptance of multi-level regional planning. Drainage basins or watersheds form most convenient as well as most appropriate spatial units for the study of natural resources particularly the basic resources like land and water.

Shafi (1969) has given a good account on methods and techniques of land use planning, land classification and land capability. According to Ali Mohamed (1978) land capability classification is related to characteristics of land such as slope, erosion, susceptibility, stoniness, salinity, presence of high water table, land use, soil texture, soil moisture and fertility of soils. In India a few of the Indian geographers who have made contributions in the field of land evaluation using remote sensing data and aerial photographs are Raju and Vaidyanadhan (1978), Raghava Swamy and Vaidyanadhan (1981), Suryanarayana (1982), Sambasiva Rao (1981 and 1982), Sambasiva Rao and Nageswari (1983), Krishna Reddy (1990), Madhuramma (1991), Madhuramma and Sambasiva Rao (1992) and Suresh Babu (1993). These researchers have taken physical elements as main criteria and evaluated qualitative land use classification. In the present study an attempt is made to bring out the land capability using remote sensing data.
(FCC's on scale 1:250,000) and Survey of India topographic sheets on scale (1:50,000) and (1:250,000) based on physical characteristics namely relief, slope, drainage, land systems, landforms, soils, land use, hydro-geomorphology and erosion susceptibility. The interpretations are carried out from the study of FCC's Survey of India topographic sheets. After preparation of pre-field maps intensive field checks have been carried out and necessary corrections in the pre-field maps are carried out to prepare the final maps.

Relief:

Physiographically the district is divided into Nallamallai and Erramallai hilly ranges. They run parallel from north to south. The Erramallais divides the district into two well defined tracts from east to west. Between Erramallai and Nallamallai lies the eastern plains consisting of black cotton soils. The north western part of the Hundri river is dominated by poor red sandy soils. The altitude varies from 300mts. to 600mts. above M.S.L. The eastern plains lying between Erramallais and Nallamallais fall below 300mts. (Fig.5.1). The north western black soil plains and central red sandy soils vary in altitude from 300mts. to 450mts. above M.S.L. The uplands and the Erramallais range in altitude from 450mts. to 600mts. above M.S.L. The
maximum height in the western plains is about 652 mts above M.S.L. The maximum height in Erramallais is 640 mts above M.S.L. The maximum height in eastern plains is 264 mts above M.S.L. The Erramallais range in altitude from 300 mts to more than 600 mts above M.S.L. They lie on the eastern part of the district. The maximum height in Nallamallais is 917 mts above M.S.L.

Slope:

The slope of the district has been worked out adopting Wentworth (1930) method. The slope has been divided into gently sloping plains (less than 2°), moderately sloping plains (2° to 5°), strongly sloping plains (5° to 10°), very strongly sloping plains (10° to 20°) and steeply sloping zones (more than 20°) (Fig. 5.2). The gently sloping plains are found on black soil plains, red sandy soils and eastern black cotton soils. They are comprised of leveled plains, rolling plains, wash plains and creep built plains and fluvial plains. The moderately sloping plains are found in piedmont plains, colluvial fans and debris slopes. The strongly sloping plains range in slope from 5° to 10° and consists of debris slopes, pediplains and residual hills. The very strongly sloping terrain has slope ranging from 10° to 20°. It lies in the parts of hilly-terrain of Nallamallai and Erramallai hills. On these slopes natural
forests are well distributed particularly in Nallamallai hills. The steeply sloping zones (more than 20° slope) are found in parts of Nallamallai hills (Fig. 5.2).

Drainage:

The major rivers flowing in the district are Thungabadhra and its tributary the Hundri, the Krishna and Kunderu. Thungabadhra rises in the western ghats and forms the northern boundary of Kurnool and Mahaboobnagar and flows in the eastward direction before joining with Krishna river at Kudalisangam. The Hundri river rises in the fields of Madakasira and drains through Maddikera, Pattikonda, Devanakonda, Bonegandla, Kodumur and Kalluru mandals. The Hundri joins in Thungabadhra at Kurnool. The Kunderu also called as Kumudvathi rises in the western parts of Erramallais, passes through Kunderu valley and flows through Orvakalm, Midthuru, Gadivemula, Nandyala, Koilakuntla, Dornipadu and Chagalamarri mandals in south eastern direction before entering into Cuddapah district.

Land Systems:

The major land systems of the Kurnool district are hilly-terrain with ridge and valley topography, denuded hills, undulating hills, rolling plains, black soil plains and fluvial plains (Fig 5.3). The ridge and valley topography
is noticed in Nallamallai and Erramallai hills. The denuded hills are found more in Erramallai hills and as isolated hills in central western parts of the district. The undulating plains consist of slope varying from $5^0$ to $10^0$ and are formed of piedmont plains, terraced plains, pediplains and bajadas. The rolling plains are formed of deep and shallow red sandy soils, wash plains and creep built plains. The slope is less than $2^0$. The black soil plains are found in western parts of the district in between Erramallais and Nallamallais in Kunderu valley. The slope is less than $2^0$. The fluvial plains are formed of river built plains and lie parallel to the river valley "s of Thubngabadhra, Hundri and Kunderu rivers (Fig.5.3). They are composed of clayey soils with slope less than $2^0$. They are fertile soils and are used for cultivation of banana, sugar canes, Turmaric, betal etc.,

Soils:

The major soils of the Kurnool district are hilly soils or insitu soils, deep red sandy soils, shallow red sandy soils, black soils and alluvial soils (Fig.5.4). The hilly soils or insitu soils are composed of rich organic matter and are located on the slope regions of Nallamallai and Erramallai hills. The dead and decayed leaves of the forest regions have added rich organic matter to the insitu
soils. Mostly natural forest are grown. In some parts of Nallamallai hills teak and bamboo plantations are noticed. The deep red sandy soils are associated with piedmont plains, valley fills and bajadas. They are composed of medium to coarse grained deep red sandy soils and are located parallel to the Nallamallai hills and around Erramallai hills (Fig 5.4). The shallow red sandy soils are associated with pediplains and are located in the central part on western side of Erramallai hills. They are also medium to coarse grained shallow red sandy soils. The soil depth varies from 0.5 mts to 1.5 mts.

The black soil plains are found on western part of Hundri basin and eastern part of the district in between Erramallai and Nallamallai hills. They are deep, medium to fine textured clay soils soil depth ranging from 2 to 5 mts. The black soils are derived from basic rocks. They are moderately, well defined cracking clay soils with P H value ranging from 8 to 8.6 mts. The permeability is moderate.

Land Use:

The land use of Kurnool district has been interpreted from the study of False Colour Composites on scale 1:250,000 of February 1994. The land use categories identified are thick forests, medium forests, degraded forests, wet
cultivable land, rainfed cultivable land, current fallows, waste lands with rocky out crop and various lands. (Fig.5.5). The thick forests are noticed on the eastern parts of the Nallamallai hills. The medium forests are found in north western parts of the Nallamallai hills. The degraded forests are found in the western parts of the Nallamallai hills. The most of the Erramallai hills the forest cover is degraded and are formed of scrubs. The hilly-terrain in this part is subjected to vary severe erosion due to lake of vegetal cover. The cultivable wet lands are found in the Hundri basin and in the Kunderu valley of the K.C.Canal ayacut areas. The major crop cultivated is paddy. The cultivable land under rainfed conditions is found in the south western, northern and eastern plains of the district. The crops cultivated are sunflower, ground nut, coriander, horsegram, jowar etc., The current fallow lands are noticed in central parts of the district consisting of shallow red sandy soils. During the field checks it has been found that ground nut is the predominant crop in the current fallows and is harvested in October and November months. The wasteland with rocky out crops are associated with pediplains. The residual hills are left barren due to exposure of insitu rocks. The ravionous lands are found in Hundri and Kunderu river valleys.
Flood and Erosion Susceptible Zones:

The erosion susceptible zones of the Kurnool district are delineated from the study of False Colour Composites based on tonal variations, drainage texture, ravine and gully formations, amount of vegetal cover, degraded forests etc. The erosion zones identified are very high, high, moderate and low (Fig. 5.6). The very high erosion zones are found in Erramallai hills without vegetal cover and in disturbed pockets. These hills are being distributed for exploitation of mineral resources like limestone, dolomite and barytes. The moderate erosion is found in the slopes of pediplains. The low erosion is noticed in western black soil plains and eastern plains located in between Erramallai and Nallamallai hills. The flood prone areas are found in the Thungabadhra, Hundri and Kunderu river valleys. The flood effected areas in the district are found along the river valley of Thungabadhra Hundri and Kunderu.

Hydrogeomorphology:

Based on landform formation, ground water level variations, recharge, specific yield and ground water potential the hydrogeomorphic units of the Kurnool district are delineated. The fluvial plains consist of excellent
FLOOD PRONE AREAS

FIG. 5.6

KURNOOL DISTRICT
FLOOD AND EROSION SUSCEPTIBLE ZONES
ground water potential due to influent recharge from the Thungabhadra, Hundri and Kunderu rivers. The very good hydro-geomorphic unit is noticed in the ayacut areas of K. C. Canal ayacut area, piedmont plains, valley fills and bajada zones. The very fair ground water potential is found in black soil plains in the western and south eastern parts of the district. The poor ground water potential is found in shallow, red sandy soils of the pediplains located in central parts of the district. The unproductive and run off zones are in Nallamallai and Erramallai hills (Fig.5.7).

The land Capability:

The land capability of the Kurnool district has been delineated based on physical characteristics namely relief, slope, drainage, land systems, soils, land use, erosion susceptibility and hydro-geomorphology. The various land classes grouped according to their hierarchy are class-1 (fluvial plains), class-2 (irrigated plains), class-3 (wash plains and terraced plains, valley fills and bajadas), class-4 (piedmont plains and wash plains) class-5 (creep built plains and black soil plains), class-6 (pediplains), class-7 (wastelands with rockyout crops).class-8 (hilly-terrain with less than 20° slope and class-9 (hilly-terrain with more than 20° slope) (Fig.5.8 and Table.5.1).
<table>
<thead>
<tr>
<th>S.No.</th>
<th>CLASS</th>
<th>LAND UNITS</th>
<th>SLOPE</th>
<th>SOILS</th>
<th>GROUNDWATER</th>
<th>EROSION</th>
<th>SOIL PRODUCTIVITY</th>
<th>SOIL AND LAND IRRIGABILITY</th>
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<tbody>
<tr>
<td>1.</td>
<td>I</td>
<td>Fluvial Plains</td>
<td>&lt;1°</td>
<td>Alluvial</td>
<td>Excellent</td>
<td>Low</td>
<td>Very high</td>
<td>Class A and Class 1</td>
</tr>
<tr>
<td>2.</td>
<td>II</td>
<td>Irrigated area other than fluvial plains</td>
<td>&lt;1°</td>
<td>Silty, Clayey Sandy loams</td>
<td>Very good</td>
<td>Low</td>
<td>Very high</td>
<td>Class A and Class 2</td>
</tr>
<tr>
<td>3.</td>
<td>III</td>
<td>Wash plains, terraced plains, valley fills and bajadas</td>
<td>1° to 3°</td>
<td>Silty, Clayey &amp; Sandy loams</td>
<td>Good</td>
<td>Low to Moderate</td>
<td>Good</td>
<td>Class B and Class 2</td>
</tr>
<tr>
<td>4.</td>
<td>IV</td>
<td>Wash plains and piedmont plains</td>
<td>1° to 3°</td>
<td>Sandy loams &amp; deep red sandy soils</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Moderately good</td>
<td>Class B and Class 3</td>
</tr>
<tr>
<td>5.</td>
<td>V</td>
<td>Creep built plains &amp; black soil plains</td>
<td>1° to 3°</td>
<td>Shallow red sandy soils &amp; black soils</td>
<td>Very fair</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Class B and Class 3</td>
</tr>
<tr>
<td>6.</td>
<td>VI</td>
<td>Pedi plains</td>
<td>3° to 5°</td>
<td>Shallow red sandy soils</td>
<td>Poor</td>
<td>Moderate</td>
<td>Low to Moderate</td>
<td>Class C and Class 3</td>
</tr>
<tr>
<td>7.</td>
<td>VII</td>
<td>Waste lands with rockyout crops &amp; pediments</td>
<td>3° to 5°</td>
<td>Shallow red sandy soils</td>
<td>Poor</td>
<td>High</td>
<td>Poor</td>
<td>Class C and Class 3</td>
</tr>
<tr>
<td>8.</td>
<td>VIII</td>
<td>Hilly terrain with slope 10° to 20°</td>
<td>10° to 20°</td>
<td>Insitive soils Runoff zone</td>
<td>High in disturbed pockets</td>
<td>Insitive soils Runoff Zone</td>
<td>Very High in disturbed pockets</td>
<td>Class D and Class 5</td>
</tr>
<tr>
<td>9.</td>
<td>IX</td>
<td>Hilly terrain with slope &gt; 20°</td>
<td>&gt;20°</td>
<td>Insitive soils Runoff Zone</td>
<td>Very High in disturbed pockets</td>
<td>Very High in disturbed pockets</td>
<td>Class E and Class 6</td>
<td></td>
</tr>
</tbody>
</table>
Class -1 :

The class-1 consist of fluvial plains formed by river action. They are found in Thungabhadra, Hundri and Kunderu river valleys. The slope is less than $1^0$. The soils are rich and fertile. The ground water potential is excellent. The erosion is very low. The soil productivity is very high. The soil and land irrigability are grouped under class - A and class -1 respectively.

Class -2 :

The class -2 land is formed of land under various sources of irrigation other than fluvial plains. The slope is gentle. The soils are composed of silty, clayey and sandy loams. The erosion is low. The ground water potential is very high. The soils are well drained. The soil and land irrigability are grouped under class A and class -2 respectively.

Class-3 :

The class-3 land consists of wash plains, terraced plains, valley fills and bajadas. The ground water potential is good. The recharge is high. The slope is less than $3^0$. The soil productivity is good. The soil and land
The class-4 land consists of wash plains and piedmont plains. The ground water potential is good. The erosion is low. The slope is less than 3°. The soil productivity is moderately good. The soils are moderately drained. The soil and land irrigability are grouped under class-B and class-3 respectively.

Class-5:

The class-5 land consists of creep built plains and black soil plains. The ground water potential is fair. The recharge is moderate. The soil erosion is moderate. The slope is less than 3°. They are moderately drained. The soil and land irrigability are grouped under class-C and class-3 respectively.

Class-6:

The class-6 land consists of shallow red sandy soils found on pediplain zones. The slope varies from 3° to 5°.
They are moderately drained. The ground water potential is poor. The recharge is low. The erosion is moderate. The soil productivity is moderate. The soil and land irrigability are grouped under class-C and class-3 respectively.

Class -7:

The class -7 land consists of waste lands with rocky outcrops and pediments. The soil formation is very poor. They are barren. The slope varies from 3° to 5° and 5° to 10°. They are undulating plains with isolated hills. The erosion susceptibility is high. The ground water recharge is low. The ground water potential is poor. The soils and land irrigability are grouped under class-C and class -3 respectively.

Class -8:

The class -8 consists of hilly-terrain with ridge and valley topography. The slope varies from 10° to 20°. The erosion is high. Both normal and accelerated erosion are noticed. The soils are insitu or hilly soils. The accelerated erosion is found in disturbed pockets of hilly-terrain for exploitation of mineral resources and
de-forested areas. The soils and land irrigability are grouped under class -D and class -5 respectively.

Class -9:

The class -9 land is formed of hilly-terrain with slope more than 20°. The soils are insitu. The surface run-off is high. The soil erosion is very high in disturbed pockets. Both normal and accelerated erosion are noticed. The slope should not be disturbed for cultivation purposes. Soil conservation methods have to be carefully adopted to minimise soil erosion. The soil and land irrigability are grouped under class -E and class -6 respectively. They are not suitable for cultivation, but natural forests could be raised.