Chapter IV
Land Resources

Land and is not only a basic resource, but also a cherish asset. It has to be utilized in accordance with its suitability and ecological capabilities, which depends on geological and biological factors. However, if unbearable pressures such as of an explosively growing population are brought to bear on the land and to overuse it and over exploit its limited resources, the ecological balance is upset. Land should be so managed as to satisfy at least the basic needs of man-food production, shelter, recreation, communication, transport, etc. Food production from the agricultural lands should not only be sustained but appreciably augmented. This calls for prevention of encroachment on fertile agricultural lands for non-agricultural purpose.

The land resources of the Pandameru and Tadakaleru river basin are studied using IRS-1B Geo-coded data and Survey of
India (SOI) topographic sheets on scale, 1:50,000. The relief and slope of the Pandameru and Tadakaleru river basin is studied from SOI toposheets. The land use, soils, hydrogeomorphic units and intensity of erosion are visually interpreted from IRS-1B Geo-coded data on scale 1:50,000 based on tonal variations, texture, shape, shadow and geomorphic processes and agents involved in the formation of landforms.

**Relief:**

The relief of the Pandameru and Tadakaleru varies from a minimum of 300 m to a maximum of 686 m above the MSL. The topography of the Pandameru and Tadakaleru basin (Fig: 4.1) shows that the relief in the northern part of the basin is less than 300 m above MSL. The altitude of more than 500 m above MSL is found in the hilly terrains of the western and southern parts of the basin. In the central and northeastern parts of the basin altitude ranges from 300 to 400 meters above MSL. Physiographically, the basin is divided into 3 classes, black soil plains in the northern and northeastern parts of the basin. The deep red sandy soils are found in the central parts of the basin. The insitu soils are found at the foots of the hills. The Tarimala hills are in the northern part. The altitude ranges from 550 m to 671 m above MSL. The western parts of the basin consists of schist belt. The altitude varies from
Relief of Pandameru and Tadakaleru River Basins

Figure: 4.1

Legend
Relief in meters
- < 300
- 300 to 400
- 400 to 500
- > 500
490 m to 686 m above MSL. The gold mines are located in southern part of the basin. The Muchchukota hills (proterozoic formations) are located in the eastern part of the basin. The altitude is 445 m above MSL. The Avuladevarakonda (A 707 m) is located in southeastern part of the basin in the northwestern part Kotanka hills (A 490 m) are found. In western part the Bhadrapuram hills (A 677 m) are noticed and in the southwestern part the Kondapalli (A 686 m) are found. In western Kudair the altitude is about 535 m above MSL.

**Slope:**

Slope of the basin has been worked out using Wentworth (1930) method. The slope units have been divided into 5 categories. The first category is less than 20° (gently sloping). The second category is 20° to 50° (moderately sloping). The third category of slope units vary from 50° to 100° (strongly sloping). The fourth category of slope units range from 100° to 200° (very strongly sloping) and fifth category of slope units are above 200° (steeply sloping) (Fig: 4.2). The first category of slope units are found in alluvial plains, colluvial plains, valley fills and shallow weathered pediplains. The second category of slope units range from 20° to 50°. They are found in piedmont plains and pediplains. The third category of slope units vary from 50° to 100°. They are found in around the isolated
Slope of the Pandameru and Tadakaleru River Basins

Figure: 4.2
group of hills. The fourth category of slope units range from $10^0$ to $20^0$. They are found in residual hills, Kudair schist belts, Julakalava hills (Muchchukota). The above $20^0$ slope are found in Tagarakunta, Kudair, Kondapalli, Kotanka and Tarimala (Singanamala) hills.

**Soils:**

The factors like parent material, climate, relief of the terrain, vegetation and the living organisms govern the genesis of soils. The characteristics and the thickness of the soil vary from place to place. To understand the soil morphology and physico-chemical characteristics with proper perspective and to manage the soil resources at sustainable level for maintaining the soil health intact, the soil forming environment of the basin is studied.

The soils of the basin are predominantly of red and black types. It is estimated that 95% of the area is of red soils and 5% of the area is of black soils. The soils of the basin have been classified according to the soil-taxonomy based on study of physiography, drainage, lithology and landforms (Fig: 4.3). The visual interpretations techniques are extensively employed in deriving information on soils are delineated based on characteristics of gray
Soils of the Pandameru and Tadakaleru River Basins

Legend
- Alluvial Soils
- Rocky Outcrop
- Deep Red Sandy Soils
- Shallow Red Sandy Soils
- Silty Soils
- Salt and Alkali affected Soils
- Black Cotton Soils
- Creepbuilt Soils
- Colluvial Soils

Figure: 4.3
tone, texture, pattern, shape and size. The various soil categories of the basin are as follows:

**Hydrogeomorphology:**

Hydrogeomorphologically the Pandameru and Tadakaleru basin is divided into six hydrogeomorphic zones. They are excellent, very good, very fair, fair, poor and run-off zones (Fig: 4.4). The excellent ground water potential is found in the fluvial plains of the Pandameru and Tadakaleru basin. The very good ground water potential zone is noticed in the structural valleys. The very fair ground water potential zone is found in the shallow weathered pediplains. The fair ground water potential zones are found in the shallow weathered pediplains. The poor ground water potential is found in the piedmont inselberg complex. The run-off zone is found in the structural hills and residual hills.

**Intensity of Erosion:**

The intensity of soil erosion has been worked out at sub-basin level using Flaxman (1970) method. From the study it is found that the intensity of soil erosion varies from 0.5 to 50 m³/hectare/year. The intensity of erosion is very high in structural hills and residual hills. It exceeds more than 45 m³/hectare/year. The intensity soil erosion ranges from 30 to 45 m³/hectare/year in
Hydrogeomorphology of Pandameru and Tadakaleru River Basins
piedmont inselberg complex. The intensity of soil erosion varies from 15 to 30 m³/hectare/year in shallow weathered pediplains. The intensity of soil erosion ranges from 5 to 15 m³/hectare/year in moderately weathered pediplains. In fluvial plains and structural valley fills the intensity of soil erosion is very low. It varies from 0.5 to 5 m³/hectare/year (Fig: 4.5).

**Land Capability:**

The land capability has been evaluated based on the physical characteristics of the basin and are identified by six classes. They are Class-I (alluvial plains), Class-II (colluvial plains), Class-III (black soil plains), Class-IV (shallow weathered pediplains), Class-V (hilly terrain with less than 20⁰ slope) and Class-VI (hilly terrain with greater than 20⁰ slope) (Fig: 4.6 & Table: 4.1).

**Class-I:**

The Class-I land consists of alluvial plains deposited by Pandameru and Tadakaleru rivers. They are located in central and northern parts of the basin. The slope is less than 20⁰. The groundwater potential is excellent. The soil fertility is very good. The recharge and specific yield is high. The intensity of erosion is very low. The soil productivity is very high. The soil and land irrigability
Intensity of Erosion of the Pandameru and Tadakaleru River Basins

Legend
Values in $m^3$/hectare/year
- 0.5 to 5
- 5 to 15
- 15 to 30
- 30 to 45
- > 45

Figure: 4.5
Land Capability of the Pandameru and Tadakaleru River Basin

Figure: 4.6
# Land Capability of the Pandameru and Tadakaleru River Basin

<table>
<thead>
<tr>
<th>S.No</th>
<th>Class</th>
<th>Land Units</th>
<th>Slope</th>
<th>Soils Fertility</th>
<th>Ground Water Potential</th>
<th>Present Land Use</th>
<th>Erosion Susceptibility</th>
<th>Land Development Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I</td>
<td>Fluvial Plains</td>
<td>&lt; 2°</td>
<td>Very Good</td>
<td>Excellent</td>
<td>Cultivated land (wet), paddy, banana, mulberry, betelnut, vegetables &amp; orchads</td>
<td>Very low</td>
<td>Land leveling, land mulching &amp; land grading</td>
</tr>
<tr>
<td>2</td>
<td>II</td>
<td>Wash Plains &amp; Valley Fills</td>
<td>&lt; 2°</td>
<td>Good</td>
<td>Very Good</td>
<td>Cultivated land (dry), sugarcane, vegetables, groundnut, paddy, horsegram, citrus &amp; orchads</td>
<td>Low</td>
<td>Land leveling, land mulching &amp; land grading</td>
</tr>
<tr>
<td>3</td>
<td>III</td>
<td>Black Soil Plains (Moderately weathered pediplains)</td>
<td>&lt; 2°</td>
<td>Moderate</td>
<td>Very Fair</td>
<td>Cultivated land (wet &amp; dry), mango gardens, mulberry, maize, sunflower, citrus, paddy &amp; dry food crops</td>
<td>Low</td>
<td>Land leveling, land mulching, land grading &amp; land bunding</td>
</tr>
<tr>
<td>4</td>
<td>IV</td>
<td>Shallow weathered pediplains &amp; Piedmont plains</td>
<td>2° to 5°</td>
<td>Moderate to Good</td>
<td>Fair</td>
<td>Cultivated land (dry), sunflower, groundnut, dry food crops &amp; paddy</td>
<td>Moderate</td>
<td>Land leveling, land mulching, land grading &amp; land bunding</td>
</tr>
<tr>
<td>5</td>
<td>V</td>
<td>Hilly terrain with less than 200</td>
<td>10° to 20°</td>
<td>Poor</td>
<td>Run-off</td>
<td>Scrubs, dry food crops, cultivable wastelands &amp; degraded forest</td>
<td>Very High</td>
<td>Afforestation &amp; terrace bunding</td>
</tr>
<tr>
<td>6</td>
<td>VI</td>
<td>Hilly terrain with greater than 200</td>
<td>&gt; 20°</td>
<td>Poor</td>
<td>Run-off</td>
<td>Forest with scrubs &amp; degraded forest</td>
<td>Very High</td>
<td>Afforestation &amp; terrace bunding</td>
</tr>
</tbody>
</table>

Table: 4.1
are grouped under class-A and class-I respectively. The major crops cultivated are paddy, mulberry, groundnut and vegetables. The land development activities that could be carried out are land leveling, land mulching and land grading.

**Class-II:**

The Class-II land is comprised of colluvial valley fills. The slope is less than 20\(^\circ\). The ground water potential is very good. The soil fertility is good. The recharge is high. The intensity of erosion is low. The soil and land irrigability are grouped under class-A and class-II respectively. The crops cultivated are paddy, groundnut, chillies and sunflower. The land development activities that could be carried out are land mulching, land leveling and land grading.

**Class-III:**

The Class-III land is composed of moderately weathered pediplains, which consists of red soils and black soils. The slope is less than 20\(^\circ\). The ground water potential is very fair. The soil fertility is moderate to good. The intensity of soil erosion is low. The soil and land irrigability are grouped under class-B and class-III respectively. The crops cultivated are paddy, mango gardens, groundnut, sunflower, ragi and other dry food crops. The land
development activities that could be carried out are land leveling, land mulching, land grading and land bunding.

Class-IV:

The Class-IV land consists of shallow weathered pediplains and piedmont plains. The slope varies from $2^0$ to $5^0$ and less than $2^0$. The soil fertility is moderate. The ground water potential is fair. The ground water recharge is moderate. The crops cultivated are paddy, groundnut, red gram and dry food crops. The soil and land irrigability are grouped under class-C and class-III respectively. The land development activities that could be carried out are land leveling, land mulching, land grading and land bunding.

Class-V:

The Class-V land is comprised of hilly terrain with less than $20^0$ slope. The slope varies from $10^0$ to $20^0$. It is a run-off zone. The soil fertility is poor. The recharge is low. The intensity of erosion is high. The soil and land irrigability are grouped under class-D and class-V respectively. The crops cultivated are dry food crops. The scrubs, cultivable wastelands and degraded forests are noticed. The land development activities that could be taken up are land bunding, afforestation, contour bunding, land terracing, stone terracing and rockfill dams.
Class-VI:

The Class-VI land is comprised of hilly terrain with slope greater than 20°. The soil fertility is poor. It is a run-off zone. The intensity of erosion is very high. The slope is above 20°. It should not be disturbed for cultivation of crops. Bio-diversity has to be maintained. The land development activities like land terracing, contour bunding, terrace bunding and rock fill dams should be carried out. This class land should be used for growth of natural forests. The soil and land irrigability are grouped under class-D and class-V respectively.