CHAPTER III

EVALUATION OF TERRAIN SYSTEMS/PARAMETERS
CHAPTER-III

EVALUATION OF TERRAIN SYSTEMS/PARAMETERS

3.1 General

The terrain systems namely the physiography, the landscape, the geomorphic display and the tectonic fabric are the reflections of the endogenic and exogenic processes that have operated not only in the geological past but are also being active in the recent years. In addition, the landuse/landcover systems and their temporal changes, if studied over a period of 60 to 100 years, will give clear information on the dynamic processes of the earth that have operated during these years. So, the geology and terrain systems are not only the basic reflections of the earth dynamic processes but also have greater control over various geohazards, like earthquakes, landslides, soil erosion, soil salinity, coastal erosion, flooding etc. Hence, in the present research study, detailed data base were generated on the geology and the terrain systems of the study area.

By detailed visual interpretation using IRS P6 LISS IV satellite data and field surveys, it is concluded that the predominating phenomenon in the study area is landslides. So, a detailed study was undertaken on landslips and also observed that not only the deforestation cause such landslides, but also various terrain parameters such as geology, geomorphology, subsurface lithology, lineament, soil, rainfall, groundwater level, landuse, etc. act as major functions of landslides. Hence, in the present research study, all the landslide contributing parameters were given deserving credits in the analysis. For understand the landslip/landslide contributing variables, the study area terrain parameters/systems to be evaluated. In this manner, the following thematic data bases were generated using satellite data and other
collateral data in GIS platform such as Lithology, Structure, Geomorphology, Tectonic Slopes, Drainage, Lineament, Degree of Weathering/Regolith cover, Landuse/Landcover, Soil Type, Relief, and Rainfall.

The detailed geological map was prepared by using satellite data and also duly incorporating the GSI maps. The lineament/fracture system diagram was generated from satellite image and also existing data using on screen digitization of GIS. Then, from such lineament, lineament density was generated using 'kernel type density option' in spatial analyst tool of ArcGIS software 9.2. The map showing thickness of subsurface lithology was generated in the form of contours in surfer platform with the help of existing geophysical resistivity data (VES) available from TWAD board and also by conducting fresh geophysical survey. The detailed geomorphology map was prepared by interpreting satellite image with limited field study. The drainage map was prepared using SOI toposheet and then, updated with satellite image. From such drainage map, drainage density map was generated using 'kernel type density option' in spatial analyst tool of ArcGIS software 9.2. Contour from the Toposheets was used to generate the slope map with the help of surface analysis option in spatial analyst tool of ArcGIS software and also by interpreting the satellite data. Slope categories were also mapped from contour map as well as by interpreting satellite data and grouped them into several classes. The soil map was generated with the data collected from the Soil Survey and Landuse Organization, Coimbatore, Tamilnadu. Rainfall map was prepared from the monthly and annual rainfall data collected from TWAD board. Landuse/landcover map was prepared from the toposheet and also by detailed interpretation of recently acquired IRS P6 LISS IV satellite data.
3.2 Lithology

The main rock types exposed in the study area were only charnockites and not much of lithological variation. The lithology of the entire shevaroy hills was studied in detail by the Geologists of the Geological Survey of India. Consequently, the GSI has brought out regional Geological maps and booklets of the study area as a part of their 150th year celebrations. Further in the present research study, raw and the digitally enhanced satellite data were interpreted for entire shevaroy hills. The lithological map prepared for the entire shevaroy hills are shown in Fig. 3.1 displaying only the major rock types. The map thus prepared for the shevaroy hills is predominantly covered by charnockites followed by Epidote Hornblende Gneiss.

3.2.1 Charnockite

This forms the bulk of rock unit in the study area, this hypersthene bearing bluish grey rock forms the basement in high grade metamorphic terrain. The charnockite has granulitic texture and carries quartz, feldspars, hypersthenes, garnet and hornblende, biotite, apatite and zircon are present as accessory minerals. Some earlier workers have classified the charnockite as garnetiferous and non-garnetiferous types depending upon respectively the presence and the absence of garnet in charnockite. Most of the peaks and high points in the shevaroy hills are found with stocks and bosses of charnockite. NW-SE trending dykes are also prevalent in the study area. The study area charnockites, they show two or three distinct sets of joints most of which are vertical, with steep dips. In yercaud hills, the general geological setting as observed by earlier authors includes rock types like khondalite, charnockite, peninsular gneiss, younger granite and dolerite. However, the shevaroy bauxites are associated with khondalite group of rocks, charnockites
LITHOLOGY

Legend

- Charnockite
- Epidote Hornblende Gneiss

Fig 3.1
and peninsular gneiss. The lateritic bauxite zone is primarily confined to khondalites and charnockites.

The different rock types of shevaroy hills are classified into: i. Khondalite group, ii. Garnetiferous charnockite (rock type occurring at the contacts between charnockites and khondalites) and iii. Charnockites. In khondalite, three alumina bearing minerals i.e. feldspar, sillimanite and garnet cumulatively contribute to the formation of gibbsite whereas in charnockite, only the feldspar present can give rise to the aluminous mineral, gibbsite. Due to the presence of foliation planes, microjoints, fractures and cleavages in the constituent minerals of khondalite, effective permeability is more in khondalitic rocks when compared to the massive charnockitic rocks (Govindaraju and Jayakumar 1990). Garnet bearing charnockites are prominent in shevaroy hills (Viswanathan and Nagendra Kumar 1982). Massive charnockites from the yercaud area in TN show petrographic evidence for post-metamorphic deformation (Asha Manjari 1993).

3.2.2 Epidote-Hornblende-Gneiss (EHG)

The gneisses are perhaps the oldest rocks (fundamental gneisses) in the district (Salem) occurring widely in the plains, covering about seven taluks including yercaud and omalur. The general direction of foliation varies from E-W to ENE-WSW with a high magnitude dip towards north or south-east. Segregated quartz-felspathic and mafic layers give rise to banded structure at some places. The gneisses are highly weathered upto 30m at places and are intruded by several ultramafic and basic rocks parallel to the direction of foliation of the gneisses.
3.2.3 Laterite

Laterite is extensively observed in the study area and occurs as mantle predominantly over charnockite forming an irregular soil horizon. In shevaroy hills, there are two reasons considered for the formation of laterite and bauxite such as sub-aerial weathering evidenced by relict structure of the parent rock and gradual changes on mineralogy and chemical composition.

The laterite cappings (bauxite deposits) are confined to about 6 or 7 hill tops including two highest peaks 'Sholakaradu' (1639 m) and 'Shervarayan' (1610 m) both in the south-central part of the hills. These peaks are flat-topped plateau so characteristic of laterite and bauxite occurrences in India. Such laterite cappings are found predominantly in the south-central part of the shevaroy hills. The lateritic bauxite deposits of shevaroy hills are derived from feldspathic gneiss called as 'leptynite'. (Krishnan 1942). The cappings in the shevaroys are traced in between roughly NE-SW trending lineaments (Subramanian and Mani 1979). The distribution of lateritic bauxite deposits in the shevaroy and kollimalai hills are confined to NE direction zones. (Govindaraju and Jayakumar 1990). The important factors which influence the origin of laterite and bauxite are climate, topography, groundwater movement, preponderance of chemical weathering over mechanical weathering, type and quantity of vegetation and nature of bedrock. Lithomarge is extensively developed in the shevaroy hills with or without bauxite. It is a clay horizon found generally between laterite and the weathered charnockite with reddish or pinkish colour. However, the shevaroy bauxites are associated with khondalite group of rocks, charnockites and peninsular gneiss. The lateritic bauxite zone is primarily confined to khondalites and charnockites.
3.3 Structure

3.3.1 Structural Trends

In the study area, detailed satellite imagery (Fig.2.1) interpretation was carried out followed by field surveys and the same has shown in the structural map. The structural map so prepared (Fig.3.2) shows that a general strike of N30°E and dip steep towards south east. There is a major and minor fault and major one is found in south-central part and minor one is found in NW part of the area and their orientations are in E-W and NE-SW respectively. Lineaments of the study area predominantly fall in 6 major azimuthal groups, they are E-W, ENE-WSW, NNE-SSW, NW-SE, NNW-SSE & NE-SW and shown in Fig.3.3. Dykes found in south, south-central and western parts and oriented in NW-SE.

Based on the geological, structural and geomorphological evidences, the geoscientists have opined that the study area, Shevaroy hills is an erosional plateau and is a relict feature carved out by erosional processes. The hills displaying vast flat topped hill. Inside the plateau surface, tight/moderate alternatively pack up of long and linear folds with general N-S to NNE-SSW orientations are found. There are two distinct sets of joints (Plate V) with trends of N-S/NNW-SSE approximating to E-W with steep to nearly vertical southerly or easterly dips. Structurally, the study area is well known as Shevaroys anticline. The plateau flanked on all sides by the escarpments and the same in further encircled by composite slopes (Asha Manjari1993). Based on the Landsat imagery interpretation, the lineaments across Shevaroy-Chitteri-Kollimalai-Pachaimalai hills have been identified.
Plate – III: Protection wall under construction in the palaeoscar area, near Karadiyur

Plate-V: Joints in Charnockite, Ghat road of Shevaroy hills
3.3.2 Lineaments

3.3.2.1 Lineament mapping

Charnockites of the study area are intensively fractured. As the degree of fracturing has been demonstrated to be one of the important controlling parameters of the terrain systems, the fracture pattern map was prepared by interpreting digitally enhanced IRS P6 LISS IV satellite imagery. The fractures or lineaments were interpreted utilizing various linearities and curvilinearities observed in tone, texture, soil tone, vegetation, drainage rectilinearities and the linearities observed in ridges and hills.

Mosaicing such fractures interpreted from the satellite image, the lineament map of the study area was prepared. By carefully removing the linear features of non-tectonic origin, the final tectonic lineament map was prepared and shown in Fig.3.3. The lineament map so prepared shows that the lineaments of the study area predominantly fall in 6 major azimuthal groups, they are E-W, ENE-WSW, NNE-SSW, NW-SE, NNW-SSE & NE-SW.

3.3.2.2 Lineament density:

The lineament density map was prepared from the lineament data using ‘kernel type density option’ in spatial analyst tool of ArcGIS software 9.2. Three lineament density zones were mapped such as low, moderate and high and shown in Fig. 3.4. The lineament density shows that there is a variation in the density values from 0.2 to 6.1 (based on weightage factor) and the peak values or the maximum is found in the N, NE, W and South-central parts of the study area.
3.4 Geomorphology

The geomorphology or the landscape architecture is the outcome or the reflection of the ongoing morphotectonic and the morphodynamic processes of the earth. These features which form the outer skin of the earth are formed by the tectonic, denudational, fluvial, marine, aeolian and other hydrological processes. The pattern and the play of different geomorphic features and their anomalies indicate various ongoing morphotectonic and morphodynamic processes over a region. Such morphotectonic and morphodynamic processes are also substantially contributes to various natural disasters/geohazards like seismicities, landslides, flooding, soil erosion etc. Hence, the detailed thematic data bases were generated on tectonic geomorphology, denudational geomorphology, and fluvial geomorphology for the study area by interpreting digitally enhanced satellite data and also incorporated the collateral data.

3.4.1 Tectonic Geomorphology

The tectonic geomorphic features of the study area was prepared using satellite data with topographical data and are mostly represented by crestlines, escarpment, tectonic slopes, barren fracture valleys, vegetated fracture valleys, and dissected plateau and shown in Fig. 3.5.

3.4.1.1 Crestlines

The crestlines are the sharp, linear, curvilinear and wavy topographic highs. These represent the foliation trends or the erosional remnants or at place the fault escarpments. General genetics and the ethics of the crestlines are that while the crestlines defined by the fault scarps or fault line escarpments are rectilinear, the
same defined by the foliation trends are curvilinear in the area. Whereas the crestline defined by active erosion have shown acute sinuosity. The map generated on crestlines shows that crestlines found more in the North and Central parts of the study area and shown in Fig.3.6.

3.4.1.2 Plateau

By interpreting the IRS P6 LISS 4 satellite data, the pattern and the spatial distribution of the plateau was brought out and shown in Fig.3.7. The vast planar landforms with micro level ups and downs, bounded by wall like escarpments on all sides and with shapeless configuration were mapped as erosional plateau. Within such erosional plateau, if there were no fractures or fracture valleys, these were mapped as undissected plateau. In such undissected plateau, generally, a uniform planation was observed. But at a few places micro mounds and micro linear ridges or linear uplands were found.

The plateau which was criss-crossed with fractures and fracture valleys were mapped as dissected plateau. In such dissected plateau, at places gullies were developed and these were interpreted as gullied plateau.

The peer review of the pattern and the splay of undissected, dissected and gullied plateau shows that dissected and gullied plateau were found almost in all parts of the area except E, W & WSW and shown in Fig.3.7.

3.4.1.3 Escarpments

With the help of toposheet and satellite data, the following escarpments were demarcated for the study area i) 's' shaped escarpments, ii) 'z' shaped escarpments and iii) rectilinear escarpments. Escarpments are found more in NE part of the study
CRESTLINE

Legend

- Crestline

Nagalur
Semmanattam
Maramangalam
Varavandi
Yercaud

Fig 36
area. The 's' shaped escarpments were found in NE and South-central parts of the study area with NNE-SSW and NE-SW Orientation whereas 'z' shaped escarpments were found in N, S, and SE with NE-SW orientation and few with E-W orientation and shown in Fig.3.8.

3.4.1.4 Tectonic valleys

Detailed satellite data interpretation was carried out along with toposheet, tectonic valleys were interpreted. There are five types of valleys were interpreted and mapped such as barren valleys, barren fractured valleys, fracture filled valleys, filled valleys and gullied valleys shown in Fig.3.9. The critical examination was made on fracture filled valleys, which may be the tectonic valleys were aligned in NE-SW direction in the N & NE parts of the study area. These tectonic valleys were filled with vegetation.

3.4.1.5 Slopes

Slope is an important factor/parameter in the terrain systems having direct contribution over various geohazards especially landslides, soil erosion, flooding etc. Particularly landslides geomorphic expression of the slope is one of important influencing parameters. So, detailed satellite data interpretation was carried out in the study area and following slope classes were brought out. Active and passive slopes, shallow-moderate-steep slopes, convex-plain-concave slopes, dissected and undissected slopes and shown in Fig.3.10, Fig.3.11, Fig.3.12, Fig.3.13.

3.4.1.5.1 Active and Passive Slopes

The slopes of the study area were divided into two classes as active and passive slopes based on the vegetational cover. Slopes with least vegetation and
Fig 3.4

Legend
- Yellow: Rectilinear Escarpment
- Blue: S-shaped Escarpment
- Red: Z-shaped Escarpment
remain as barren outcrops as the slope processes like landslide and landslide related do not allow the vegetation grow were marked as active slopes. The slopes with thick vegetal cover were demarcated as passive slopes. Such active slope areas and passive slope areas were digitized in ArcGIS and a GIS image was generated and shown in Fig.3.10.

3.4.1.5.2 Shallow-Moderate-Steep slopes

By using topographic data and satellite data, the zones of shallow slope area (less than 20 degrees), moderate slope (21-45 degrees) and steep slope areas (more than 45 degrees) were demarcated, such zones were also digitized and GIS image was generated and shown in Fig.3.11.

3.4.1.5.3 Concave-Plain-Convex Slopes

Again with the help of topographical and satellite data, the slopes were demarcated into concave, plain and convex slopes. The slopes showing convexity and mound shape were marked as convex slopes. The slope showing smoother and plain configuration were marked as plain slopes. Whereas the slopes having boat and bowel shapes which were invariably filled with vegetation were marked as concave slopes. The above said slope categories were also digitized using ArcGIS 9.1 and GIS image was generated and shown in Fig.3.12.

3.4.1.5.4 Dissected and Undissected slopes

Based on the drainage density and gullies, the slopes were classified into dissected and undissected slope classes. The slopes with more drainage density and gullies were demarcated as dissected slopes. The slopes with less drainage
ACTIVE AND PASSIVE SLOPES

Legend
- Active
- Passive

Fig 3.13
DISSECTED AND UNDISSECTED SLOPES

Legend
- Undissected Slope
- Dissected Slope

Fig 3_13
density were marked as undissected slopes. Such slope categories were also digitized and a GIS image was generated and shown in Fig.3.13.

3.4.1.5.5 Integrated Slope Morphometry

Using the overlay function in ArcGIS, all the following images (slope categories) were integrated:

- Active - Passive slopes
- Shallow – Moderate - Steep slopes
- Concave – Plain - Convex slopes
- Dissected - Undissected slopes

Firstly, the GIS image having active and passive slopes was kept as image ‘I’ and the image having ‘shallow-moderate-steep slopes’ was kept as image ‘II’ and both images were overlayed and integrated into a single image which resulted into the following 6 classes such as active-shallow slope, passive-shallow slope, active-moderate slope, passive-moderate slope, active-steep slope, and passive-steep slope and shown in Fig.3.14.

Secondly, the above integrated image (Fig.3.14) was kept as image 1 and the image having concave-plain-convex slopes (Fig.3.12) was kept as image 2 and both images were integrated into a single image. This has resulted into following 18 slope categories such as active-shallow-convex slope, active-shallow-concave slope, active-shallow-plain slope, active-moderate-concave slope, active-moderate-plain slope, active-moderate-convex slope, active-steep-concave slope, active-steep-plain slope, passive-shallow-convex slope, passive-shallow-plain slope, passive-shallow-concave slope, passive-moderate-concave slope, passive-moderate-plain slope, passive-moderate-convex slope, passive-steep-convex slope, passive-steep-plain slope, passive-steep-concave slope, and passive-steep-plain slope.
LEVEL I INTEGRATED SLOPES (ACTIVE-PASSIVE AND STEEP-MODERATE-SHALLOW SLOPES)

Legend
- Active-Steep
- Active-Moderate
- Active-Shallow
- Passive-Steep
- Passive-Moderate
- Passive-Shallow

Fig 3.14
concave slope, passive-steep-plain slope, and passive-steep-convex slope and shown in Fig.3.15.

At the next stage, these two images (Fig.3.14) & (Fig.3.15) were kept as input images and over which the image having dissected and undissected slopes (Fig.3.13) was superposed. This has resulted in following 36 classes.

Active-shallow-convex-undissected slope; Active-moderate-concave-dissected slope
Active-moderate-concave-undissected slope; Active-moderate-plain-undissected slope
Active-moderate-convex-dissected slope; Active-moderate-convex-undissected slope
Active-steep-concave-dissected slope; Active-steep-concave-undissected slope
Active-steep-plain-dissected slope; Active-steep-plain-undissected slope
Active-steep-convex-dissected slope; Active-steep-convex-undissected slope
Passive-shallow-convex-undissected slope; Passive-moderate-concave-dissected slope
Passive-moderate-concave-undissected slope; Passive-moderate-plain-dissected slope
Passive-moderate-plain-undissected slope; Passive-moderate-convex-dissected slope
Passive-moderate-convex-undissected slope; Passive-steep-concave-dissected slope
Passive-steep-concave-undissected slope; Passive-steep-plain-dissected slope
Passive-steep-plain-dissected slope; Passive-steep-convex-dissected slope
Passive-steep-convex-undissected slope; Passive-shallow-concave-dissected slope
Passive-shallow-plain-dissected slope; Passive-shallow-plain-undissected slope
Active-shallow-convex-dissected slope; Active-shallow-plain-dissected slope
Active-shallow-plain-undissected slope; Active-shallow-concave-dissected slope
Active-shallow-concave-undissected slope; Passive-shallow-convex-dissected slope

All the 36 classes of slopes are brought in one image and shown as slope architecture of the study area and shown in Fig.3.16.
LEGEND

- Active-Shallow-Convex
- Active-Shallow-Plain
- Active-Moderate-Convex
- Active-Moderate-Plain
- Active-Steep-Convex
- Active-Steep-Plain
- Passive-Shallow-Convex
- Passive-Shallow-Plain
- Passive-Moderate-Convex
- Passive-Moderate-Plain
- Passive-Steep-Convex
- Passive-Steep-Plain

Fig 3.15
LEVEL III INTEGRATED SLOPES
(LEVEL II AND DISSECTED-UNDISSECTED SLOPES)

Legend
1-Active
2-Passive
3-Steep
4-Moderate
5-Shallow
6-Convex
7-Plain
8-Concave
9-Dissected
10-Undissected

Fig 3.16
3.4.2 Denudational Geomorphology

3.4.2.1 Distribution of Palaeoscars

After duly scanning all earlier studies and also duly analyzing the present topographic and accessibility conditions of the area, the field work was conducted and in addition, IRS P6 LISS 4 satellite data was studied in detail and the palaeoscars were demarcated. Finally 46 numbers of landslides were located in the study area and shown in Fig.3.19. Some of the landslide/paleoscars are shown in Plates I and II.

3.4.2.2 Degree of Weathering

To find out the input of denudational geomorphology over landslides, a detail analysis was done. The map showing thickness of regolith cover (thickness of top soil and the weathered zone) was generated in the form of contours in surfer platform with the help of existing geophysical resistivity data (VES) and also by conducting fresh geophysical survey and observations in road cuttings and drainage sections. The same has shown that the thickness of weathered zone varies from as low as 1m to as high as 6m in this area and six categories were mapped such as 0-1m, 1-2m, 2-3m, 3-4m, 4-5m, and 5-6m. However, the contour map prepared has shown that the thickness of weathered zone is maximum in southern part whereas in N & NE parts of the area and shown in Fig.3.20.

Fluvial Geomorphology

The drainage is the index of the overall terrain system. The drainage density indicates the porosity and the permeability of the area, whereas the drainage pattern suggests the tectonic architecture of the area. On the contrary, the drainage
LOCATION OF LANDSLIDES

Legend
- Landslide Location

Fig 3.19
Legend
- Geophysical VES Locations
- Weathered Zone Contour (m)
Plate – I: Palaeoscar near Yercaud

Plate – II: Landslide occurrence in hairpin bend of the Ghat road, near Karadiyur of Shevaroy hills
anomalies and the temporal changes in the drainage flow indicate the ongoing morphotectonic and morphodynamic processes of the planet earth. Hence, detailed thematic data base were generated on the drainages.

3.4.3.1 Drainage Architecture

The drainages are one of the important indices in understanding mechanical properties of soil, which have direct control over landslides. For understand the drainage architecture of the study area, the SOI topographic data was analysed and interpret all the drainages, drawn updated with satellite data and shown in Fig.3.21.

3.4.3.2 Drainage Density

The drainage density map was prepared for the study area from the drainage data using kernel density option in spatial analyst tool of Arc GIS software. Three drainage density zones were mapped such as low, moderate and high. Such drainage density maxima zones were found clustered more in the N, NE and NW parts of the area and shown in Fig.3.22.

3.4.3.3 Drainage Pattern

The drainage map so prepared was analysed and drainage pattern was brought out the zones of sub-dendritic and herringbone pattern were deduced and shown in Fig.3.23.

3.5 Landuse and Landcover

The landuse and landcover is yet another vital index reflecting the natural processes as well as the anthropogenic activities of the man's interaction with the natural ecosystem, cause degradation of land. When natural land cover is kept
DRAINAGE

Legend

Drainage

Fig 3.21
DRAINAGE DENSITY

Legend
High
Low
Moderate
protected and kept intact, it remains in equilibrium with various geological, structural, geomorphological and other terrain parameters. But, as and when the natural cover is disturbed by the human beings for various developmental activities, without understanding the natural landscape ecology, it causes drastic degradation of the land and major hazards are caused.

Hence, to understand the input of such landuse/landcover over geohazards, the SOI Toposheets of 1:50,000 scale and also the IRS P6 LISS IV imagery of 1:50,000 scale were interpreted and the landuse and landcover was prepared and shown in Fig.3.24. The landuse/landcover map so prepared has shown the following 9 types in the study area such as Town, village, coffee plantation, forest, forest plantation, scrub forest, mining, tank, and lake.

3.6 Relief

Relief is an important parameter to understand the terrain parameters, so as to understand the relief of the area, from the contour data generated from SOI toposheets using spatial analyst tool of ArcGIS and six categories of relief (<400, 400-600, 600-800, 800-1000, 1000-1200 and >1200) were demarcated and shown in Fig.3.25.

3.7 Soil Type

The mechanical properties of soil have all along been claimed as one of the important parameters so as to understand the soil type. The soil map was generated with the data collected from the Soil Survey and Landuse board. The same has shown eight types of soil were mapped using GIS, they are Hill soils (Mixed soils), Irukur (Red Insitu – Non-calcareous), Kambuthukki (Brown soils – Non-calcareous),
LANDUSE/LANDCOVER

Legend
- Town
- Village
- Coffee Plantation
- Forest
- Forest Plantation
- Scrub Forest
- Lake
- Mining
- Tank

Fig 3.24
Ooty (Brown soils – Non-calcareous), Pilamedu (Black soils), Somayanur (Red colluvial – Calcareous), Yercaud (Brown soils – Non-calcareous), and Soil association (Mixed soils) and shown in Fig. 3.26.

3.8 Rainfall

The rainfall has been unanimously demonstrated as one of the important triggering parameters of landslides from the studies carried out all over the world. The rainfall data were collected for the years 1966-1988 and 1997-2008 from 3 stations Pappireddipatti, Danishpet and Yercaud. The map showing rainfall was generated in the form of contours in surfer platform with the help of rainfall data.

3.9 Synthesis

The geohazards are partly natural and partly human induced. The geology and the terrain systems not only stand as a testimony for the palaeo and ongoing morphotectonic and morphodynamic processes but also totally control various geohazards or the disasters. Hence, in order to understand the input and the control of such geology and terrain systems and also to develop new techniques for landslides hazard zonation mapping, various thematic data bases were prepared using remote sensing, field surveys and GIS as Lithology, Structure, Geomorphology, Landuse/Landcover, Soil, Rainfall, Relief, etc. for the study area.
Legend

- Hill Soils (Mixed soil)
- Irugur (Red Insitu)
- Kambalthukki (Brown soil)
- Ooty (Brown soil)
- Pilamedu (Black soil)
- Somaynar (Red Contiuual)
- Soil Association (Mixed soil)

Fig 3.26