

## CHAPTER II

### 2. TOPOGRAPHY AND GENERAL FEATURE

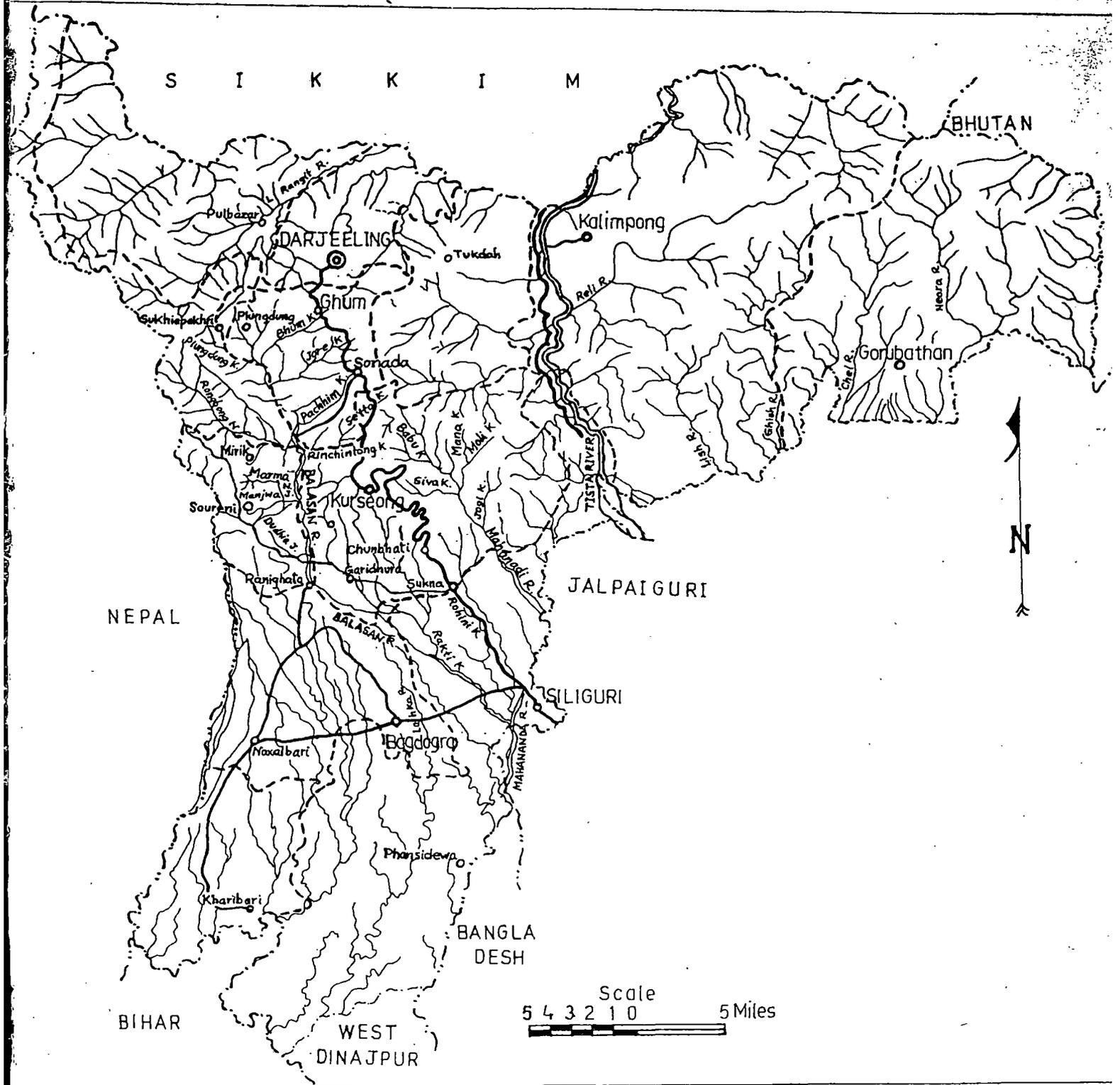
#### 2.1 Mountain System

Darjeeling is a mountaineous district (Map 2) and constitutes the lower Himalayan part of mountain Kanchanjunga. Yet 28.1% of the area forms the Terai and Plains at its foot. The mountaineous areas show a sharp physiographic contrast to the area falling in the plains, with most of the hills arising abruptly rather than gradually from the plains, a factor not noted in several other Indian hill stations (e.g., Simla, Mussoorie, Shillong, Nilgiris etc.). The altitude varies from as low as 130 m at Siliguri to as high as 3660m (at Sandakphu) and 3800m (at Phalut-Gosha). Gosha falls inside the state of Sikkim but has been included here for its continuity with Phalut and close similarity of vegetational structure).

Ranging from a trijunction boundary of Purnea, north Dinajpur and Darjeeling (140-180m amsl) to Siliguri (180m); Sukuna (200-300m), Bagrakote (250m) and Jholung-Gairibas (200-300m), the areas constitute the Terai and Plains of the district with a western boundary of River Mechi to Nepal. The River Teesta separates Kalimpong subdivision from rest of the district and Sikkim while River Rangeet does so to Darjeeling and Sikkim. Along and apart the two banks of Teesta, rise up the hills abruptly forming zigzag ranges, spurs and deep V-shaped valleys, the open valley being absent. The western hills, most of which are covered with tea estates, ascend to Kurseong (1450-1600m). To the north of Kurseong the ridges form Dowhill (1900m) and Mahaldiram (1800m). This further undulates towards natural forests of Baggaonra (1500-2000m) and more steeply to Senchale (2300m) and Tigerhill (2450m). The ridge then descends to the township of Ghoom (2250m) which leads to Darjeeling proper (town 2000-2200m). The ridge that bifurcates at Ghoom leads another course to Mirik (1200-1500m) through Sukiapokhari-Jorepokhari (2000-2350m) and Simana (2300m). The ridge at Simana gives an end to Tea gardens and a way to the crest of Singalila mountains. From the base at Maney-Bhanjyang (1900-2100m) the steep rise of mountains lead to Chitray (2500m), Tonglu (3000m), Gairibas (2800-3000m), Kalapokhari (3300m) and Sandakphu (3400-3660m) to the peak of Phalut (3600m). The mountain Gosha (3800m) of Sikkim meets the boundary at this point. The ridge further extends to Chowbhanjyang (3400-3600m) from where the trekking road descends down towards Samanden (2400m), Ramam (2200-2500m), Rimbick (2000-2400m) and along river Ramam to Bijanbari (500-1500m). The river Ramam takes on other tributaries here and becomes little Rangit, which joins Great Rangit at Singla (300-800m).

Kalimpong subdivision on the east of River Teesta has more than one base to the hills, such as Bagrakote, Samsing, Jholung and River valley itself. The slopes arising from Mongpong-Pankhaban forest rise to Yangmakum (1000-1600m) and futher to Charkholay (1600m) where it meets its sister ridge from Bagrakote (250m) across Nimbong (1000-1200m). Together they head to Lolaygaon (Kafer) 1800-2200m, and to Labha (2100-2300m). The ridge coming from Sepkhola-Kamshi forest traverses across Durpin (1500m), Kalimpong town (1200-1450m), along Algarah (1500-1900m) to Labha. Another ridge joins here from Reshi River through Pedong (1000-1500 m) and Damsang Garhi (a historical place/forest (1800-2200m). The ridges to Neora Valley arise from Gorubathan (300-1000 m) and Samsing forest (300-1200 m) which rise along Thosum (2500-2800m) and Ruka peak (2480m)

# MAP OF DARJEELING DISTRICT SHOWING ROADS AND RIVERS



to Rachela peak (3150m). This further stretches to Rachela Chak or Jorepokhari (3040m) and Tinsimana (3100m). The ridge to west from here joins Labha through Aloobari (2380m) and Pankhasari (2200-2500m). The River Neora flows down along Jaributti (2190-2300m) from Jorepokhari. The eastern slopes heads down to Tangta (2805m), Todey (2000- 2600m) and Godak (1200m) to Jholung.

## 2.2 Lakes and Tanks

There are six natural lakes in the district at hill summits and all of them are in dying stages, except the one at Mirik which has been developed to attractive tourists boating spot, after 1970. The one at highest altitude is at Kalapokhari (*black lake*, name of the place derived from lake itself) at 3250m (pl.1), near Sandakphu. Another lake is situated at 6th mile, Takdah (2050m). The remaining three lakes are known with similar name 'Jorepokhari' (double lakes). They are at Rachela peak (3040m), Yangmakum (1550m), and Sukiapokhari (2300m). There are seven artificial lakes constructed as water reservoirs, two of them in Senchale, three at Delo, Kalimpong and one each at Algarah and Labha.

## 2.3 Natural Divisions

The district enters the mountain system of Himalayas from Phalut (a corruption of Lepcha name *Phak lut*, meaning peeled summit) at one point and from Rachela (corruption of Lepcha and Bhutanese name *Richila*, meaning Summit God or Land of Sages) to Tibetan mountains through Jalepla pass.

There is no clear and distinctive natural division except River Teesta that separates Kalimpong sub-division from rest of the district and Sikkim and River Rangit that flows between Sikkim and Darjeeling sub-division of the district. On the head and above the district level, lies the vast spread of deceiving snowy mountains (looking continuous from Phalut but actually forming several separate hillocks).

## 2.4 Snow Range and Glaciers

Darjeeling hills are rated as unparalleled in the world by many, in view of the perpetual snow turban. The mighty Kanchanjunga (8578.9m) flanked by series of snow covered peaks presents the beauty to the hills. The snow ranges comprise of 12 peaks rising above 6096m. Sandakphu, Phalut and Rachela are only three places in the district which experience snowfalls regularly from December to March every winter. Frequent snowfalls are experienced by regions of Tonglu and above. Chitray, Meghma, Tigerhill-Senchale, Baggaonra, Darjeeling town, Takdah, Labha and Pankhasari have occasional snowfalls coming down to above 2000m (latest snowfall recorded to this level being 22-26 December 1995 and 14-15 January 1996).

## 2.5: Drainage and River System:

The Drainage and River system may be considered to be of three categories. In the first category, are the largest and important rivers, the Teesta, originating from glaciers of North Sikkim (5000m) and Rangit, originating from Singalila mountains (4500m) which in fact is the river Ramam while inside Singalila ranges. Both these rivers are fed by numerous tributaries from within the limit of the district.

Most of the rivers of Darjeeling district eventually drain southwards though, the Ghoom and Labha saddles cause a number of rivers rising on their northern face to flow northwards. Therefore, a complicated system of drainage have evolved amidst the myriad interlacing ridges and ramifying spurs (Map 3).

In the second category there are eleven rivers (volume-wise) that traverse the Terai and Bhabar regions themselves and come down to plains, except Reili, Ramam and Reshi (Table 2.5)



pl.1

1. Kalapokhari Lake(3200 m).
2. Confluence of River Teesta & Rehi with surrounding forest slopes of Nazoke & Ryang.
3. River bank Forest view (Teesta) at Chitray (300 m).
4. River Neora at Jaributti (2200 m).



pl.2



pl.3



pl.4



pl.5

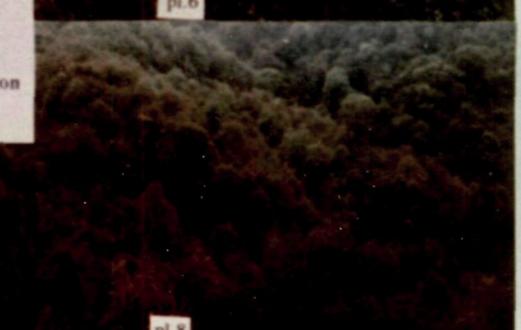
5. Dominant since ages, *Rhododendron* (trunks) forest at Rachel (3000 m).
6. *Arunadimaria maling*, dominating the landscape at Pankhasari (Neora valley 2400 m).
7. Jaributti (meaning herbal medicine) flatland of Neora valley (2200m).
8. A view of succession to climax vegetation at Aloori, Neora valley (2400m).



pl.6



pl.7



pl.8

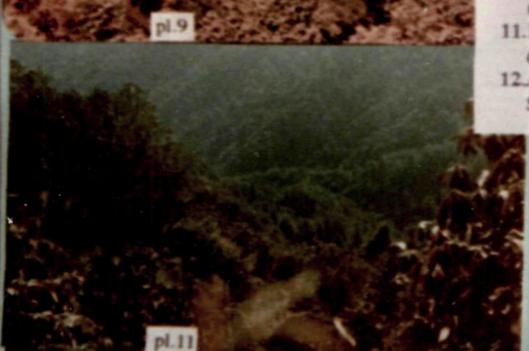


pl.9

9. Forest view at Sandakphu (3400m).
10. Subalpine meadow of Sandakphu-Phalut (3600-3660m).
11. Forest view at Samanden-Ramam (2300m)
12. *Abies-Rhododendron* Association at Sandakphu (3500m).



pl.10

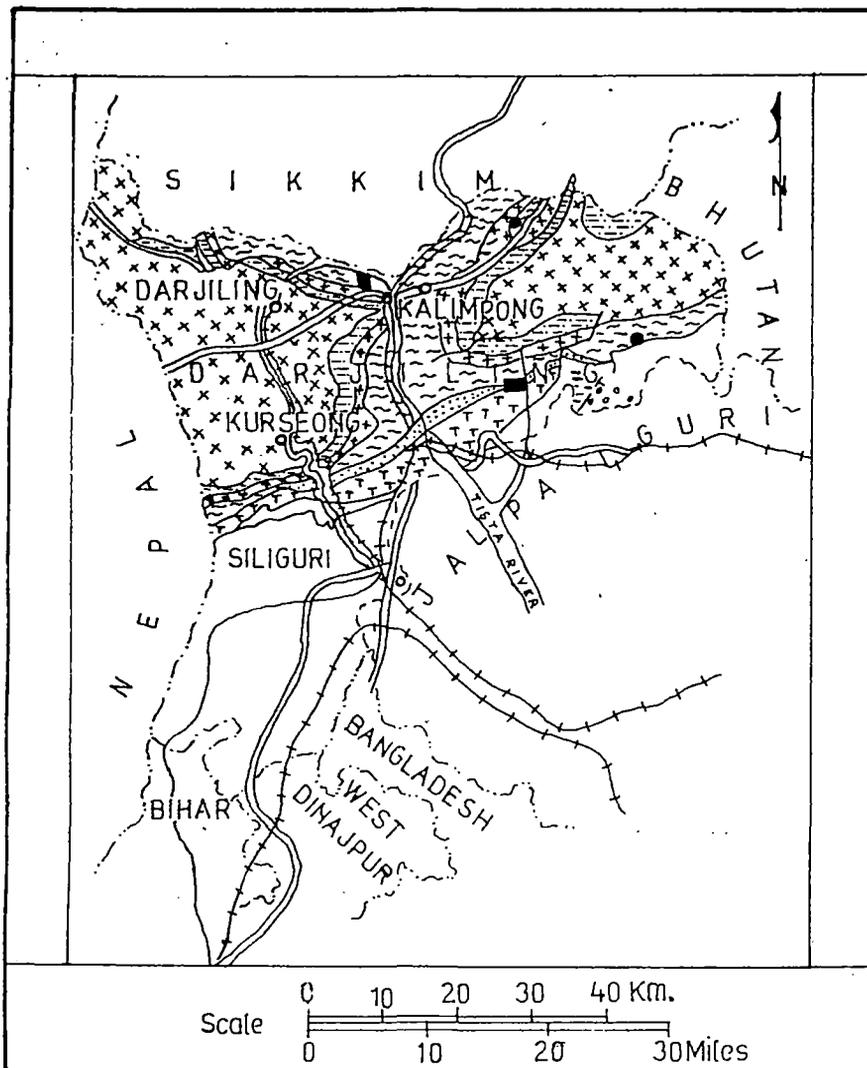


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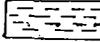
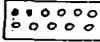
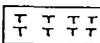
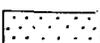
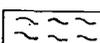
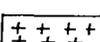
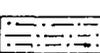
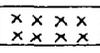


pl.12

MAP 4  
GEOLOGICAL & MINERAL MAP  
OF DARJILING DISTRICT



INDEX

-  Recent Alluvium
-  Older Terrace
-  Siwalik Group
-  Damuda Sandstone, Quartzite, Shale and Coal Seams
-  Daling Group - Shale, Phyllite and Schist
-  Lingtse Gneiss
-  Chungthang Group - Calc silicate Graphite schist  
Garnetiferous mica schist and Biotite gneiss
-  Darjiling Gneiss Group, Kyanite - Sillimanite bearing  
schist gneiss and Granetiferous biotite gneiss

MINERAL

-  Coal
-  Lead - Zinc - Copper

Table 2.5 Second category rivers and its origins in Darjeeling district.

	Rivers	Originating from
1.	Mahanadi	Mahaldiram 1900m
2.	Balasan	Lapchayjagat 2200m
3.	Mechi	Mountains of Nepal
4.	Gish Khola	West face of Labha 1900m
5.	Lesh Khola	Samthar Pabringtar 1250m
6.	Chel	South face of Labha 1800m
7.	Neora	West face of Rachela 3000m
8.	Relli Khola	Algarah-Labha 1800m
9.	Jaldhaka	Eastern face of Rachela 2800m
10.	Ramam	Singalila 4500m
11.	Reshi	North face of Rachela 3000m

In the third category there are sixty seven of perennial streams which grow stronger only during rainy seasons. They are Ratokhola, Shirikhola, Parthamkhola, Gurdum, Lodhoma, Rithu, Dilpa, Pal-majua, Jhepi, Kalikhola, Sarjam, Laring, Neora (2), Lopchu, Rungdung, Peshok, Geil and Ryang in Darjeeling subdivision. The streams of Kurseong subdivision are: Rambhi, Kalikhola, Setikhola, Damk-hola, Sevoke, Siva, Babul, Jotikhola, Jogikhola, Gulma, Ghoramara, Singhi, Pulungdung, Rangbhang, Marma, Dudhay, Chenga, Manjha, Bhim, Rongmuck, Paschhim, Rinchingtong, Rungchung, Rakti, Rohini, Kiyang, Ashli and Manakhola. The last six are Terai rivers. The Kalimpong subdivision has the following streams: Ramphoo, Kashyong, Simana, Pala, Khani, Charkholay, Panbu, Nichu, Bindu, Assam, Sati, Sipchu, Jiti, Pareng, Naksal, Kiring, Chisang, Murti, Dhaula, Thosum, Mundum, Git, Tar and Bhalukhola.

In addition there are innumerable smaller tributaries feeding these rivers and streams through-out the mountains, most of them drying up in winters.

## 2.6 Geology and Soil

### 2.6.1 Geology

The great Himalayan system got elevated during the tertiary period on the site of ancient Tethys Sea and has accumulated sediments of different ages. The present relic of high peaks and deep valley (Map 4) have been curved by the erosional force of wind, water and snow, the three principal agents of denudation. Such disintegrated mountain products form horizontal layers of unconsolidated sand, silt and pebble fragments at the foot of hills.

The district may be divided to four geological tracts:

- (1) *Hard Rock region*, consisting of unaltered sedimentary rocks in southern hills and different grades of precambrian metamorphosed rocks over the rest of the area.
- (2) *Bhabar belt*, comprises rock fragments, big boulders and fine grained clastics derived from hard rock area characterising the region with steep slopes, bouldery surface and forest of tall trees.
- (3) *Terai belt* is a swampy area composed mostly of coarse granular materials and clastics.

- (4) *The alluvial plain* consists of succession of layers of sand, silts and clay with occasional gravel beds and lenses of peaty organic matter.

Intense folding, thrusting and metamorphism resulting in a number of tectonostratigraphic units characterise the rocks of the mountaineous part of the district. Metamorphosis is noticed from slate to chlorite sericite schist, golden silvery mica schist, garnetiferous mica schist and coarse grained Gneiss.

According to the report of the Geological Survey of India (Pawde & Saha 1976), the rock type of the following formations are observed from South to North in the district of Darjeeling:

1. *Siwalik formation*, comprising of coarse grained sandstone, Shaly sand stone, Siltstone and Conglomerate.
2. *Gondwana formation*, comprising of felspathic and micaceous quartzitic sandstone, carbonaceous shales, thin lenses of crushed and sheared coal and pebble/boulder bed.
3. *Buxa formation*, comprising predominantly of dolomite, orthoquartzite, variegated phyllite interbanded with quartzites/dolomites.
4. *Daling formation*: It is mostly represented by slates, phyllite, quartzose phyllite interbanded with quartzites, quartz-chlorite, sericite-schist, epidiorite, carbonaceous phyllite and, quartzite sulphide mineralisation are mostly located in the quartz-chlorite schist horizon.
5. *Darjeeling formation*: It comprises garnetiferous biotite Gneiss, varieties of high grade schistose rocks and migmatite.

One interesting feature noticed is the progressive zones of metamorphism in the rocks of Daling and Darjeeling Gneiss groups. The complexity of structure and metamorphism, that the rocks have undergone is what characterises the geology of the district in general. The report, further states that the metapelites and samites of Darjeeling district have been subjected to three generations of fold movements and shearing, faulting and thrusting.

### 2.6.2 Soil

In the hills of the district soil of three different colours, namely white, gritty red and black are found. The geological disposition of the underlying rock determines the nature and quality of the soil. Black soil has been found to be very fertile, white the least, the red soil occupying a rather intermediate position.

The soil in the plains region is a fertile alluvium, a light sandy loam or even wholly sandy or gravelly. In the forests, a thick mantle of humus soil, formed by death and decomposition of plant and animal remains cover the ground surface. Red and yellow soil have developed in the higher slopes of Himalayas. The greater portion of the area is lying under Darjeeling Gneiss which commonly decomposes to stiff reddish loam and stiff red clay and pure sand, a condition favourable for cultivation of tea. Along the banks of Teesta silty loam and silt predominates.

In broad considerations the soil in the Siwaliks is pale yellow with coarse texture, on the Daling grey and porous, on the Gondwanas sandy and on the Gneisses a brown clay, sometimes plastic, shallow and sticky.

Almost everywhere the soil is residual i.e., derived from weathering of underlying rocks. The impervious clay is found mixed with the grains of quartz, feldspar and flakes of mica. This has a bearing to the massive landslips in the hills.

### 2.6.3 Mineral Wealth and Coal

The district contains valuable mineral deposits. The coal bearing rocks were reported for the first time by Sir J.D. Hooker in 1849 from Pankhabari and Gorubathan (Dalimkot). During 1896-1900 A.D. a total of 7231 tonnes of coal was raised from Gorubathan until the enterprise was closed (Banerjee 1980).

Among the minerals, copper occurs in Kalimpong, Peshok, Mirik, and Gorubathan. Graphite occurs as embedded in mica schist along Darjeeling-Peshok ridge, Ghaiyabari, Mungpoo, Rakti valley, lower Singalila range and Labha. Iron ores varying from strong ferruginous clay to an impure hematite are reported from Samalbong and Seokbir (Kalimpong) and Lohagarh (Kurseong Terai). Three sources of lime viz.: Dolomite, limestone buds and calcareous tufa have been reported from numerous zones, chiefly the junctions of Gondwana and Tertiary. Senchale ridges, Pankhabari, Yangmakum and Great Rangit are important among these. The positive indications of occurrence of uranium have been traced by the Geological Survey of India in 1980-82, from Yangmakum-Tik ridge.