# GEOBOTANICAL SIGNIFICANCE OF KURSEONG HILL AREA UNDER DARJEELING SUBDIVISION

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***Abstract*: Geobotany is a term that signifies the characteristic features of geological and botanical value of a particular place or region. Kurseong is one of the best known regions in Darjeeling Subdivison which has tremendous geobotanical significance. The geomorphology of the Kurseong hill area can be well explained by the geological features, rock structure and soil characteristics of the area. Geo-eco-tourism is one of the major attractions among tourists visiting Kurseong hill area. Knowledge about different types of rocks, minerals, their characteristics, utilities and their role in nature would definitely have a good impact on students, scholars, foreigners and natural tourists. The geo-botanical significance and based on that geo-eco-tourism will not only help in the further exploration of the study area but also it will create awareness towards preservation of the natural resources. This will improve the livelihood of the local residents, enhance employment and income sources, increase infrastructure of Kurseong hill area and protect the natural resources of the area. Knowledge of climate, rock and rainfall will also help in conducting experiments in regard to quality and quantity of tea production.**

***INDEX TERMS* - Geobotany, Kurseong, geomorphology, geo-eco-tourism, minerals, hill, Darjeeling**

## INTRODUCTION

Kurseong is a part of extra peninsula. The rocks are of the ages ranging from Precambrian to quaternary. There are three types of geological formations found within the region. The Mahaldiram dome from where Mahanadi has been originated is a naturally sinking area. This region is a compound of altered metamorphic rocks of Daling formation. The Damudas are highly sheared and tectonically active. The contact zone between Damuda and Daling series is well marked by the contract in lithological characters. The geomorphology of the Kurseong hill area can be well explained by the geological features, rock structure and soil characteristics of the area. Alongwith this, the climate and water resources of the area will provide a clear-cut picture of the study area to feature the terrain of the study area.

## MATERIAL & METHODS

The rock formation in the area occurs in the following order:-

## MIOCENE

Tracked from Mechi river in the west to Kalijhora in the east, the Siwaliks appear north to Sukna. It comprises micaceous and arkosic sandstones, bluish and grayish siltstones, comglomerates and pebble beds. Sometimes, the bands of Limestones and lenticels of lignite are also seen. The general strike is North North East –South South West (NNE-SSW). The dip is around 300 and it becomes steeper towards the Gondwanas contact and is less than 300 towards the plain of Siliguri (Anonymous 2008). The soil formed over these rocks is sandy, generally poor developed. Along the banks of the Tista, silts and silty loam predominate. The soil is pale yellow in colour and coarse in texture where sand rocks predominate and it is red and finer where sandstones predominate (Brady et al.). Valuable Sal forests occur on this formation.

## PERMIAN

The gneiss rocks occur in Phuaguri, Dhobijhora, Mahaldiram, Chattakpur and part of Paglajhora, Majua, Mana and Babukhola blocks. The soil is a brown clay, generally shallow and poor so that trees of short boles are produced. Forests mainly of upper hill type are found here with the characteristic vegetation. The Daling series occur in the Berrick, Kundong, Khairbani blocks and part of Majua, Mana, Babukhola, Paglajhora, Sivakhola blocks. The soil here is dark grey, porous and rich and good for tree growth. Panisaj, Toon, Lampate, Malagiri and Saur trees growing in these areas attain excellent height and girth. Sal is found growing almost on base rocks in this Berrick, Kundong and Khairbani blocks. The Damuda sandstones, conglomerate and shales, with associated discontinuous semi-anthyacitic caol seems and thin band of limestones, constitute narrow belt between the Daling series in the north and Siwaliks in the south. The Gondwanas group span the time from the upper carboniferous to the Jurassic or Middle cretaceous and comprise strate whose thickness is from 20,000 to 30,000 ft. damuda system include a series of formation of the lower Gondwana and derives its name from the river Damodar. Barakar is a series of the Damuda system which derives its names from the river Barakar in the Raniganj coal-field region. It consists of a thickness of 2,500 feet of white to fawn coloured sandstones and grits with occasional conglomerates and beds of shale. The sandstones contain more or less decomposed feldspars. Because of their uneven hardness, the sandstones weather with a rough surface and produce potholes in streambeds. This stage contains much carbonaceous matter in the form of streaks, lenticel and seams of coal. This is the chief coal bearing stage in practically all the lower Gondwana areas of India. The Barakar seems to have been laid down in a series of large shallow lake some of which were probably connected by streams. The coal appears to be due to the accumulation of large amount of debris of

terrestrial plants accumulated under quiescent and stagnant conditions. The Barakars are found in the Darjeeling area with occasional coal seams at Pankhabari and other places. A glacial boulder bed has been noted at the Tindharia at the base of the Gondwanas. These rocks, in general, extend from Kalijhora alongwith the Siliguri-Kalimpong road in the east to the Balasan river.

The Sandstones are shales containing thin coal seams, often yielding lower Gondwana plant fossils, viz. Glossopteries indica, Vertebrarai indica, Schizoneurous etc. the dominant strike is East North East-West South West (ENE-WSW), with dips ranging between 400 to 900 towards North North West (NNW). Near the Daling contact the sandstones having slates and carbonaceous or even graphitic schist, which has lost a large proportion of its volatile matter and approaching Anthracite in composition (Anonymous 2008). The Damuda occur in Bamanpokhri, Latpanchar, Kuhi, Upper Ghoramara, Gola, Ruyem and Sitikhola forest blocks. The soil over sandstones is sandy and very poorly developed to sustain vegetation. The soil formed from the Damuda rocks appears to be unsuitable for Sal and this may be the reason of upward limitation of occurrence of Sal in this division as composed to the adjoining forests. Even where Sal occur on such soil, their growth is much poor when compared to the Sal trees growing in adjacent areas of Siwalik sandstones.

**ARCHAEANS**

The Himalayan Archaeans have not been studied in a much detail as some of the Peninsula Archaeans. With the metamorphism and igneous intrusions suffered by Himalayan rocks in Archean times, they have been subjected to the mountain building movement of Tertiary times and sheared, over thrust and often invested. They present therefore, extremely complicated structure. The Archeans include the Darjeeling gneiss and the Daling series of rocks, predominantly politic in nature and show characteristic regional metamorphism from chorite to sillimanite grade. The Daling Series consist mainly of slate and phyllites, passing upward into the Darjeeling gneiss, with silvery mica schist as transition rock. The upper boundary of Dalings, commencing from west passed through Khairbani, Gayabari Tea Estate, Gayabari Railway Station and Sitong peak (5,587 ft) in the east. The rocks have high dips of $45^0$ to $70^0$ towards north-north-west. Some traces of copper ore are found on the western side of Mahanadi.

The Darjeeling Gneiss occupies the greater part of the Division and consists of garnetiferous mica-schist, quartzites and biotite-kyanite and sillimanite gneiss. The gneiss is always well foliated, much folded and crumpled. It is highly micaceous and is composed of colourless or grey quartz, white opaque feldspar, muscovite and biotite. It varies in texture from a fine grained to moderately coarse rock. Red and yellow soils have developed on the Gneisses and schists of the area. The greater portion of the hill area lies on Darjeeling Gneiss which most commonly gives a stiff reddish loam, but may also produce pure sand or stiff red clay. The red colouration of the soil is due to the disintegration of biotite in the gneiss. This type of soil is mainly ferruginous, siliceous and aluminous, with free quartz as sand. It is usually poor in lime magnesia, iron-oxide, phosphorous and nitrogen but fairly rich in potash, some parts being quite rich in potassium derived from muscovite and feldspar of the gneiss.

**RECENT AND SUB-RECENT DEPOSITS**

These deposits constitute alluvial debris, bolders, gravels, hill-wash and alluvium. The deposits are divided into Bhabar belt, the Terai belt and the Alluvium. The Bhabar belt is composed of rock fragments, big boulders and fine grained clasticks which are derived from Gneissic area. The Bhabar belt is characterized by rather steep slopes, bouldery surface and forests composed of tall trees. The Terai belt separated from the Bhabar from the spring line, is the zone of rejected re-change and as such has developed swampy condition and is composed mostly of coarse granular materials alternating with finer clastics. The alluvium consists of succession layers of sands silt and clay with occasional gravel beds and lenses of peaty organic matter. The thickness of the alluvium is variable, but it is believed to increase towards the plain of Siliguri. The area south to the Siwaliks, bounded by Mechi in the west, Mahananda in the east, and upto Siliguri town, is entirely covered with alluvium, consisting mainly of Silts, sandstones, gravel and boulders brought down by the rivers and streams. The commonest form of the alluvium soils in the area is light sandy loam. The fertility of these soils vary a great deal, depending on the terrain from where the alluvium has been brought. Riverian types of forests occur on alluvium of recent origin. Best Sal forests are found on old alluvium.

**MINERALS**

Coal occurs as beds in the sandstones near Tindharia. The coal is crushed and is mostly powdery. These coal beds were exploited in the recent past and were later on abandoned. Some tracts of copper ore are reported to occur west of the western side of the Mahanadi. Gneiss, which is easily split along the joint planes into blocks of convenient sizes, is used for rubble masonry. The quartzite occurring near GiddaPahar can be used as road metal, railway ballast and concrete aggregate. Bolders and gravels of gneiss and quartzite brought down by the streams are abundantly found in the foot-hill zone. In the Lohagarh area, east of the Mechi river, occurrences of iron ore varying from ferruginous clays to impure brown hematite are reported in the tertiary sandstones. The length of the outcrop, east to west, is 1.5 km. while the thickness near the centre is about 30m. The ore is of poor quality and contain a maximum of 30 percent iron.

**GROUNDWATER**

In the Gneisses, schist, slate and clay-beds circulation of groundwater takes place through joint and fissures and near the surface weathered material. Hence, the chances of accumulation of large quantity of water are remote. In the Bhabar belt the water percolates rapidly and therefore, the water table occurs comparatively deep down. In the Terai area, there are possibilities of encountering ground water artesian condition. In the alluvium tract, there are possibilities of encountering saturated zone of yielding groundwater.

**CLIMATE**

The climate varies from tropical to sub-tropical to temperate with rise in elevation. The highest temperature of about $36^0$C occurs in the month of May to June in the plain whereas the lowest of $2^0$C occurs in the month of December and January in upper hills. The distribution of rainfall in different month throughout the year gives a clear-cut picture that the rain fall increases with the increase in altitude (Sarkar 1988).

**WATER SUPPLY**

The main rivers, flowing through the study area are Teesta, Mahanadi, Balasan and Mechi. All these rivers are perennial, although except Teesta all the others are rain-fed. The rivers have a general southern flow. Kurseong sub division consists of four watershed regions, namely -Mechi river watershed, Balasan river watershed, Mahanadi river watershed and Tista river watershed.

**CONCLUSION**

Geo-eco-tourism is one of the major attractions among tourists visiting Kurseong hill area. Over the years the rock structure, rainfall and geomorphology of Kurseong hill area has been the major tourist attraction items. Knowledge about different types of rocks, their characteristics, utilities and their role in nature would definitely have a good impact on students, scholars, foreigners and natural tourists. This will not only help in the further exploration of the study area but also it will create awareness towards preservation of the natural resources. Geo-ecotourism will enhance rock-climbing, cave exploring and trekking activities among eco-tourists which will further create an opportunity of more and more local employment and revenue generation. In other words, this will improve the livelihood of the local residents, increase infrastructure of Kurseong hill area and protect the natural resources of the area. Knowledge of climate, rock and rainfall will also help in conducting experiments in regard to quality and quantity of tea production.

People are nowadays interested to know the present, past and future of a tourism destination. Very often, the fossil accumulations are also available at such destinations. The display and interpretation of such fossils can reconstruct the palaeo-environment and create tourism interest (Sanyal). Stalactite/Stalagmite caves can also be a source of tourist attraction. Other than these, the erosion features, volcanic features, tectonic features can also become a part of geo-eco-tourism. Geological features have the great potentiality to attract tourists having quest for knowledge which is the primary requirement of a hardcore eco-tourist (Sanyal).

**RAM-LAXMAN CAVE-**

The wonderful lighting inside the famous Stalactite/Stalagmite caves of "Dan-ur-Ogof" of Wales in UK attracts hundreds of tourists to enjoy the reflection of colours. Such caves are available in Latpanchar hills under Kurseong Sub-division known as Ram-Laxman cave. With proper maintenance it can be a major source of tourist attraction.

**SANDAN DANRA-**

In the Middle Hill area on way down from Mirik to Khairbari a large patch of Sandan (Ougenia dalberjoides) is met with. This patch is also locally called as "Sandan Danra" which is formed on a pure clay patch where underlying rock is the Gondwana shale. This is a Geo-ecotourism destination.

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