

# CHAPTER II

*Climate  
Natural Vegetation  
and  
Soil*

CLIMATE SOIL AND NATURAL VEGETATION

No separate nomenclature has been attributed to the Mayurbhanj Upland in the climatic map of Orissa. In fact, the whole of the State of Orissa has been included in a single climatic unit - tropical savanna type by Koppen (1924), and sub-humid type of Thornthwaite (1933). It is in the rainfall characteristics, mainly, that the northeastern part of Orissa including the Mayurbhanj Upland deviates from the rest of the State. Koppen (1924) has emphasized rainfall less than 6.1 cm for at least one month in a year in his climatic type, while Thornthwaite (1933) has implied deficiency in winter rain. This is true for the rest of the State, excepting the northeastern part, which gets more winter rain.

Temperature Condition :-

The mean maximum and minimum annual temperatures in the surrounding areas of the Mayurbhanj Upland is  $91^{\circ}\text{F}$  ( $31^{\circ}.3\text{C}$ ) in April-May and  $59^{\circ}\text{F}$  ( $15^{\circ}\text{C}$ ) in December/January. No temperature data are available for the interior parts of the Upland. So, allowing for modifications due to altitude, this is the nearest possible account of temperature. During late February, however, when the area was once visited by the author, a striking

range in diurnal temperature was experienced. Also it was observed that during the post monsoon period the diurnal range of temperature was much less.

#### Role of Temperature as a Geomorphic Process :-

Repeated heating and cooling of the rock surfaces in the area in response to the fluctuating temperature brings about mechanical rock disintegration. This happens because rocks are composed of a variety of minerals which have different specific heat and coefficient of expansion. The result is the development of strain in the body of the rocks which ultimately disintegrate. During field tour, quartzites were seen to have undergone block disintegration and lie in rugged heaps.

#### Rainfall Conditions :-

The State of Orissa as a whole comes under the path of the Southwest Monsoons because of its location in the tropical belt. The amount of rainfall is lower than in West Bengal. But during the Monsoons, particularly in September and October, cyclones from the Bay of Bengal move along the Brahmani- Burehabalang interfluvium, and the northeastern part of Orissa, including the Mayurbhanj Upland, gets considerable amount of rainfall. During winter, local depressions move along the Ganga Plains, and again,

due to its proximity to West Bengal, the northeastern part of Orissa gets some amount of rainfall. So, this part of Orissa is in a more advantageous position to receive rainfall more often than the rest of Orissa.

The rainfall is not very well-distributed throughout the year. The annual amount received is over 50 inches (127 cm), and most of it is received during the Monsoons from June to September, which amounts to over 40 inches (102 cm). The rest is irregularly distributed throughout the winter months. The number of rainy days is about 75 per year. About 63 days are included in the Monsoon period, and the rest again is irregularly distributed throughout the winter months. (1. 2).

#### The Effect of Rainfall on River Regime :-

The irregular distribution of rainfall is not sufficient to maintain a steady flow in the rivers of the area. Whatever water is found in the rivers in the dry season is from seepage. During the field work in February, incidentally a dry month for the area, the rivers appeared as mere trickles, and were reduced to stagnant pools of water in certain localities. Some dry valleys were also noticed in the area.

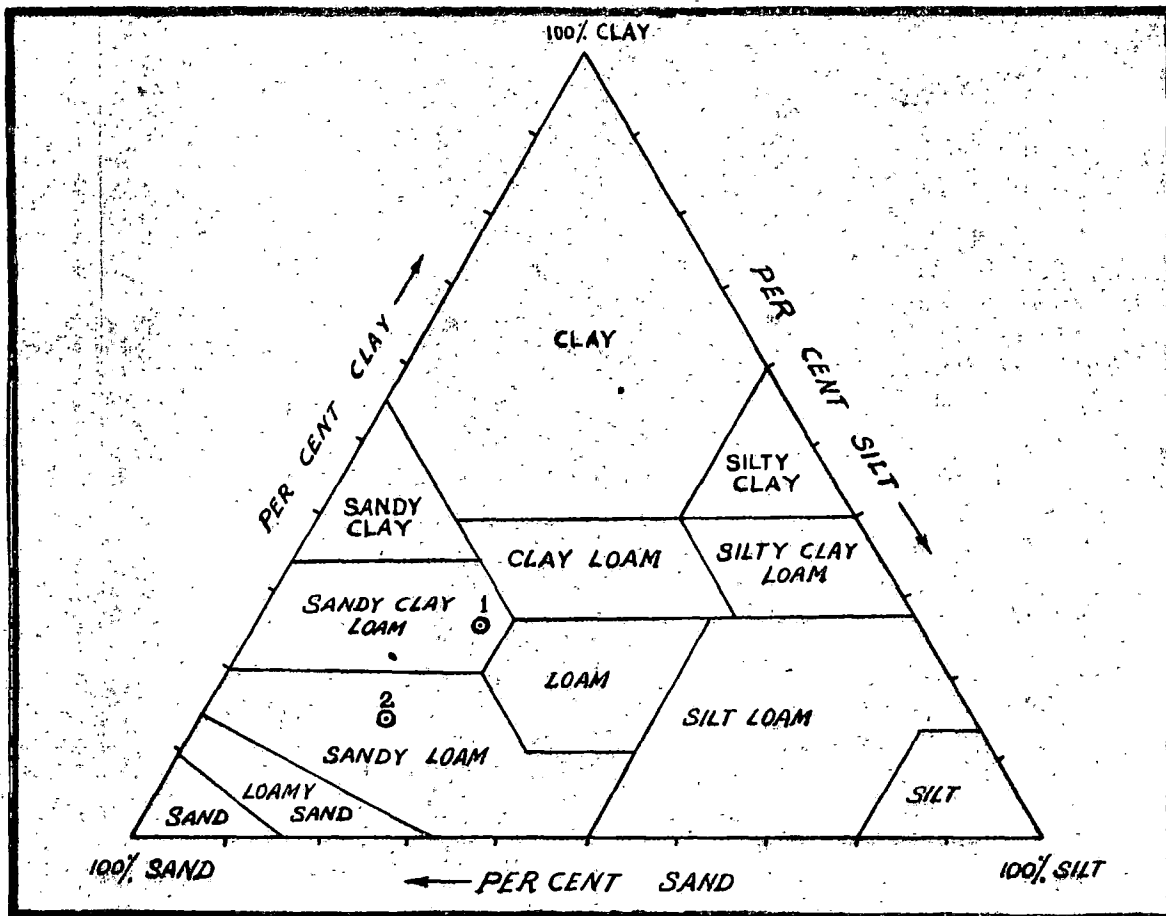
The sudden concentration of rainfall during the Monsoons affects the rivers greatly. According to local people, the rivers which could be walked across without even wetting feet, become such surging torrents that they are unsurpassable unless bridged. The height of the banks and the dry beds of the rivers confirmed such high stages. The steep gradient of the rivers in the hilly area, however, does not permit frequent flooding.

#### SOILS :-

The soil map prepared by Roy Chaudhury (1963) shows the Mayurbhanj Upland having red earths. Sinha (1971) on the other hand stresses occurrences of red earths and also laterites in the area. The District Gazetteer of Mayurbhanj (1961) describes the plateau tops as covered by high level laterites. Also considering the extensive distribution of laterite in the adjacent regions of Chotanagpur and Keonjhar plateaus, it is quite normal to find laterite in this plateau area as well. During field tour also, the whole region was seen covered by laterites ranging widely in texture.

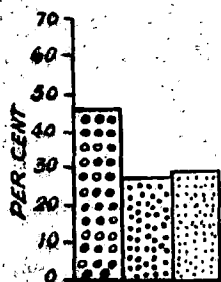
#### Origin of Laterites :-

Wadia (1919) has dealt in some details with the

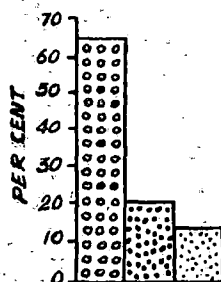


### GRAPHICAL REPRESENTATION OF TEXTURE

SAMPLE I  
SANDY CLAY LOAM



SAMPLE II  
SANDY LOAM



Soil Texture

problem of the origin of laterite. According to him the origin of laterite is intimately connected with the physical, climatic and denudational processes at work in India. The subject is full of complexities, and although many hypotheses have been advanced by different soil scientists, the origin of the (high-level) laterites as yet, is a much debated question. One source of difficulties lies in the chemical and segregative changes which are constantly going on in this rock, and which obliterate the previously acquired structures and produce a fresh arrangement of the constituents of the rock.

It is probable that laterites of all different places have not had one common origin, and that widely divergent views are possible for the origin of different varieties.

The probable origin of the laterites of the Mayurbhanj Upland may be stated as the result of the sub aerial decomposition in situ of basalt and other aluminous rocks under a warm, humid and monsoonic climate. The silica is removed in solution, and the salts of alkalis and alkaline earths, derived from the decomposition of the ferromagnesian and aluminous silicates, are dissolved by percolating water. The remaining alumina and iron oxides become more and more concentrated and become mechanically mixed with the other products liberated in the process of decomposition. Vesicular or porous, so

characteristic of laterite, is due to molecular segregation taking place within the products left behind.

Composition of Laterite :-

Laterite is a vesicular, clayey rock, composed essentially of a mixture of hydrated oxides of alumina and iron, with small percentages of other oxides often present. The iron oxide generally preponderates and gives the rock its prevalent colour. At places the iron gets concentrated into granules.

Varieties of Laterite :-

Laterites are usually classed into two groups :- high-level laterites and low-level laterites. The high-level laterite, according to Madia (1969) never occurs below 2000 feet (610 m), altitude and is characterised by massive homogeneous grains and uniform composition. The low-level laterites occur on lower tracts, is less massive and is of detrital origin, as it is formed of the products of mechanical disintegration of the high-level laterites. So the chief difference between these two varieties is in the age of their formation, the low-level laterite being obviously more recent, compared to the high-level laterite, and the second difference lies in their genesis.

Field Observation on Laterites :-

The laterite caps are known to be of great thickness. The author had the fortune of visiting a drilling site near Garguria village on a hill top. The borings revealed a soil profile about 18 ft (5.5 m) in depth below which it struck the bed rock. Laterites varying in colour and texture were found to extend till about 10 ft (3 m) after which a greyish brown soil marked the transition to the lava below. The District Gazetteer of Mayurbhanj (1961) also describes the high-level laterites as having depths varying between 3 and 6 metres in thickness.

The horizontal distribution of laterite was seen to be extensive. Only difference apparent was of textural composition. The hill slopes had granules and pebbles of laterite concretions on the surface whose diameter range approximately from 2 to 10 mm. These may be regarded as high-level laterites. The interfluvial areas and valleys typically contained dusty and fine textured laterites. They are probably of secondary origin and may be regarded as low-level laterites.

To find out if there exists any textural difference between low-level laterites, two samples collected in the

area were subjected to mechanical analysis. The results are given below :-

TABLE I

Distribution of Soil Separates for  
Two Samples from Mayurbhanj Upland.

(Source of Sample 1 :- Near Nawana Dak Bungalow

Sample 2 :- Near Gurguria Dak Bungalow)

Soil Texture Group	Classification after U.S. Dept. of Agriculture (Diameter in mm)	Result of Analysis (Weight in per cent)	
		Sample No.1	Sample No.2
Very coarse sand	2.00-1.00	0.00	2.00
Coarse sand	1.00-0.50	4.50	7.35
Medium sand	0.50-0.25	10.30	11.00
Fine sand	0.25-0.50	10.65	18.45
Very fine sand	0.10-0.25	21.05	26.20
Silt	0.05-0.10	25.25	20.50
Clay	Below 0.002	28.25	14.50
	Total	100.00	100.00

The above data were plotted on triangular diagrams. Sample 1 indicated loamy character while sample 2 indicated sandy loam in character. The data were plotted also graphically (Fig.2.00) to facilitate visual comparison.

#### Geomorphic Significance of the Texture :-

The laterites in general provide open textured and friable soils. The high-level laterites of the area are more porous and permeable on account of the large interspaces between the particles. The low-level laterites, as indicated by the table, show comparatively less coarse texture. But because the proportion of sand is high in both, they are considerably porous and allow percolation of water. As a result, high rate of infiltration in the region reduces surface run-off even after heavy rains. Lesser number of drainage channels have been formed in the area due to the high rate of infiltration and the drainage texture has become moderately coarse. An analysis of the map of drainage texture of the area in Chapter VII has revealed this character more clearly.

#### Natural Vegetation :-

Under the hot and humid climate with a seasonal concentration of rainfall, has developed an extensive and dense forest cover in the Mayurbhanj Upland.

Rich red loam and laterite with high organic content in the soil supports distinct and complex flora and fauna in the Mayurbhanj Upland.

The forests in the Upland, belong to the broad classification of North Indian moist tropical forests with sub-groups like moist peninsular high level sal forest, moist peninsular low level sal forests, moist peninsular valley sal forests, moist sal savanna, Orissa tropical semi-evergreen forests and very moist peninsular sal forests. The most valuable and extensive sal forests are the moist peninsular valley sal. Asan, bahada, haldu, kusum, champa, simal etc. are common associates of sal in this forest type. The forests contain many interesting ferns, orchids, herbs and shrubs of high medicinal value. The rare and virtually extinct gymnosperm, gentum has also been reported to exist in the area in addition to numerous cycads. Species of wild lemon and willows are also found along the lower part of the valleys. An undergrowth of tall sabai grass is common in many areas of the forest. The most important forest produce include large amount of sal seeds, sal resine, arrowroot, honey, edible fungi etc. which are collected by local inhabitants for home consumption or marketing.

Fauna :-

The Mayurbhanj Upland is well-known for its

various types of wild life. The animals and birds of the area constitute the distinctive and attractive fauna of the Peninsular India. It is the area for tiger reserve. It has tigers like Panthera tigris, Panthera pardus, other animals like elephant (Elephas maximus), Sambar (Cervus unicolor), gaur (Bos gaurus), hyaena (Hyaena hyasne), Kutra, wildboar, porcupine, spotted deer, common langur, Rhesus monkey, antelope, pangolin, slothbear, jungle cat, wild dog etc. are in abundance.

Varied forms of bird exist in the area. The most important of these are hill mynah (Gracula religiosa), pointed spur fowl (Gallus unnlata) and pea-fowl (Favo cristatus). Other important avian fauna are wood pigeon, dove, spur fowl, horn bills and parrots. Partridges, quails, malabarpies, orioles, bulbuls, parakeets and racket-tailed Drangoes are also common in the area.

In addition to the above, other fauna include various types of hill stream fishes including mahaseer. A large variety of poisonous and non-poisonous snakes are found all over the place. The mugger or marsh crocodiles, once common in deeper pools, are now found only in few areas. Lizards and various forms of forest insets including lepidoptera, hoppers boress, gall forming, lac forming insets and soil mites exhibit an excellent faunic composition.

In view of the rich flora and fauna, the area has been declared as a sanctuary. Part of it with a core area of 303 km<sup>2</sup> was constituted in a tiger reserve in 1973 under project tiger in order to provide improved habitat to the dwindling tiger population of the area. All tree felling in the core area have been stopped by Government order.

Geomorphic Significance of a Dense Vegetation :-

Great significance is attached to a dense vegetation in geomorphology. First, a dense canopy helps to reduce the intensity of run-off and consequently prevents soil erosion. Secondly, the roots of the plants bind the soil particles together as a result of which less soil is washed off. Also, laterites being open and friable, have a greater tendency to get displaced. The roots provide useful anchorage to them and increase their permeability. For this reason especially, forest cover is very essential to protect soil from erosion and thereby to protect the scattered and tiny agricultural fields of the area on which the living of the people of the locality depends to a very great extent. During the visit to the area certain areas on hill-slopes, which are devoid of forest cover, were found to have been severely affected by soil erosion and extension of gullies.