CHAPTER XIV

Summary and Conclusion

SUMMARY AND CONCLUSION

The Mayurbhanj Upland belongs to the Mayurbhanj district of Orissa and is flanked by the Keonjhar Plateau in the West and the Baripada plain in the east.

The sudden change of the geologic and physiographic characteristics of the Upland, as it rises abruptly from the surrounding lowland, distinguishes it as a compact physical, geologic, and obviously, a geomorphic unit. It is mainly because of this special character of the Upland that it was selected for the present study.

Geologically the area is a relic of the oldest Dharwarian landmass of India. Banded hematite-quartizites caused by Pre-Cambrian intrusions in Dharwar sediments occur in the western part of the area. Granites with batholithic mass and dykes, mostly doleritic also cover a large area in the Upland. Basalts also cover a substantial area in the Upland with rims of quartzite in the marginal parts. The beds of the sedimentary metamorphics dip towards the centre of the Upland forming a basin structure.

The central part of the Upland exceeds 3000 ft (914 m) in elevation. The whole area forms an oval-shaped Upland, elongated in the north-south direction and covers an area of about 1000 mi^2 (2590 km^2).

The area is drained by a number of streams of which the most important are the Burhabalang and its tributaries in the eastern half which join the Bay of Bengal, and the Khairi and others in the western half which join the Baitarani River in the west. In certain areas e.g. in the granitic country, the streams have developed dendritic pattern of drainage, while in other places joints and faults in the rocks have produced rectangular drainage pattern.

Red soils, produced by the decomposition of basalt and granite, are found almost everywhere in the Upland. High level laterites are also common.

Climatically the area belongs to the Tropical Savana Type of Koppen and sub-Humid type of Thornthwaite. May to August is the rainy season the total annual rainfall is about 127 cm. Temperature varies from 15°C to 31°C in the surrounding plains and is obviously lower by about 5°C in the Upland.

The area contains numerous varieties of plants, animals, birds and insets. The most important commercial timber is Sal. The whole area is very thinly populated with a few scattered villages and hamlets. The inhabitants, mostly tribals, depend on agriculture and collection of minor forest produce for their livelihood.

Satellite imageries and aerial photographs were analysed

in order to study the landform characteristics. The satellite imagery used in the present work was on a scale of 1:1,000,000 while the aerial photographs used were on a scale of 1:60,000. As such, the satellite imagery was studied in order to understand the physical setting of the Upland in relation to its surroundings while aerial photographs were studied with the purpose of identification of minor features like individual ridges, escarpments, settlements and agricultural fields, and even some micro-features like rills and gullies controlled by small and medium-scale faults.

The arcuate bend of the western boundary of the Upland, more or less concentric with similar arcs of hill ranges further west, as depicted by the satellite imagery, suggests that structurally the Mayurbhanj Upland is not an isolated one but is a part of a gigantic structure whose centre is located in the Mayurbhanj Upland itself.

Drainage texture of variable character as observed in different parts of the Upland through aerial photographs reflected the rock character and composition in those areas. Granitic areas often show coarse feature and dendritic pattern of drainage with exfoliation domes and other associated features in the central part of the Upland.

Flat upland terrain with denser stream network controlled by joint systems is typical of the basaltic terrain in the area

as depicted by the aerial photographs.

Micro-relief features as observed by field study as well as by the study of aerial photographs include rills, gullies and badlands in certain areas, particularly in the western border areas, as well as features of lesser prominence like earth pillars, mole hills, ant hills, rabbit burrows etc., particularly in the forested Upland as well as in the fringe areas.

Geomorphological mapping of the area was done with a view to represent the different types of landform present in the area as well as their mode of origin.

Gurguria and its surroundings on the Jamuna River were mapped on a scale of 1:25,000 to represent the details of smaller features like the Basaltic rim, Colluvial Zone, Dissected Older Alluvium, Lateritic Upland, Dyke Ridges and Alluvial Flats.

Features of larger dimension like High Plateaus of Ferrugenous Shale, Granite and Basalt, Low Plateaus of Quartzite, Granite and Complex Geological Formation, Plains, and features of recent formation like Alluvium and Talus Cones were represented with proper symbols so that such basic information could be used by the geomorphologists, planners and others while planning for the development of the area.

Initially it was intended to establish a denudation

chronology for the Mayurbhanj Upland. Also it was decided to apply morphometric techniques to substitute field work wherever necessary. In the foregoing section, the utility of morphometric analysis in unraveling the geomorphic evolution of the area has been considered.

One of the main problems associated with study of the relic surfaces of an uplifted erosional plain is that very little of the old upland remains undissected by the rejuvenated streams which erode headwards. Field work is not very effective for matching the accordance of the relic surfaces. Here the morphometric methods score above field work. The methods like superimposed Landscape profiles and Altimetric Frequency Analysis very efficiently note the accordance of levels of whatever remnant erosion surface is there.

In case the erosion surface is preserved or only slightly dissected because of the recency of its upliftment, the methods like Altimetric Frequency Analysis are not suitable. Instead, area-height diagrams and clinographic curves very effectively indicate the extensive erosional surfaces at particular height ranges and breaks of slope that could be associated with upliftment. The value of these methods lies in comparative study, and common results strengthen an interpretation.

Various other morphometric methods like the inter-contour

distribution of area, width, slope, are useful for a visual representation of quantitative data, and for correlation purposes. The river profiles are effective in bringing out the recent upliftments in the region by the breaks in their long profiles. The cross profiles also confirm the upliftment by showing incised valleys at the lower altitudes.

The Cartographic Maps are useful for showing areal distribution of geomorphic characteristics and strengthens the hypothesis of upliftment by bringing out topographical unconformities between an older landscape at the top and younger landscape resulting from incision of streams at the marginal areas.

The Statistical Indices have provided a satisfactory quantitive medium for studying homogeneity and heterogeneity between different drainage basins. The laws of Drainage Composition when applied to the drainage basins have also proved that a general dimensional unity exists between the different basins - in spite of some heterogeneity displayed by the Statistical Indices.

But most of the morphometric methods are not fully suited to bring out a polycyclic landscape, e.g. the Area-Height Diagrams and Clinographic Curves do not depict the upper erosional surface in the area very clearly. Perhaps the most satisfactory among the different morphometric methods is the Landscape Profiles which bring out both accordant peaks and extensive plain areas. The various arrangements of the profiles are excellent for studying

the regional extent of a particular surface.

Yet, in spite of all the morphometric evidences, no level can be accepted as final unless confirmed by the geological map of the area ; accordance of summits and surfaces can be due to structure control and nick-points can be associated with resistant outcrops, unless the geological section shows a truncation of rocks of varying resistance involved in the accordant surfaces, or breaks in profiles of rivers located in homogeneous rocks without structural control.

Field work was felt necessary for the final checking of the erosional surfaces as suggested by the morphometric and other methods. Truncation of rock structure and concentration of fragments of resistant rocks on the level surface, as observed during the field work, indicated peneplanation at least at one stage although the existence of another surface at a lower elevation indicated by the morphometric methods could be the result of differential weathering leading to the partial degradatic of the initial surface to a lower one at least in its outer margins

The history of evolution of the landform of the Upland is one of recurring uplift and downwastage during the past 100 million years or so, which led to the formation of the present spectacular landscape geometry. The variety of rocks dating from Archaean to the Recent Periods forming the area is discernable from its protruding surfaces. The study of structure and tectonics of the

area reveals the following facts :

The area is a transition between the Chotonagpur Plateau of Bihar on the one hand and the eastern ghats on the other.

The central part of the Upland experienced peneplanation during the pre-Cambrian period resulting in the formation of a flat level surface at about 3000 ft (914 m) which has degenerated into smaller patches of flat lands at a lower elevation in the areas bordering the flat upper surface. The break-in-slopes, numerous waterfalls, uniform skyline and the exposure of pre-Cambrian rocks constituting the upper surface give evidence to the above facts.

The general structural characteristics include a major basin structure for the whole area with in-facing dipslope and out-facing escarpment mainly dominated by quartzites which form the rims around the central upland.

Several faults occur in the area mainly in the north-south direction which control the alignment and character of the drainage to a large extent.

Field observation in the area reveal certain characteristics which may be stated as follows :

(i) Granitic boulders in the upland tend to develop exfoliation layers by the process of physical and chemical weathering under

humid tropical environment.

(ii) The quartzites forming the rims around the central upland, and also the isolated quartzite bands, are usually highly jointed and disintegrate into angular fragments ; the massive ones forming protrusions through the granitic or basaltic surface.

(iii) Weathering of basalts gives rise to red soil in the upland which supports a dense vegetation as well as agriculture in selected localities.

(iv) Weathered granitic rocks also support a dense vegetation in the area.

(v) Rills, gullies and badlands have developed in certain localities in the Upland and particularly in the areas bordering the Upland in the west.

The predominating drainage pattern in the area are radial from some localized hills in the Upland and also rectangular in the areas dominated by perpendicular joint systems. In certain cases it is found that the rivers tend to follow a circular path following the out crops of resistent rocks which form rim-like features around the central upland.

Man and Environment in the Mayurbhanj Upland :

History tells us that in the later part of the 19th century

human settlements were found only in the frontiers of the central core of the Upland. Private concerns exploiting forest resources with the permission of the administration started encouraging human settlements even inside the forest during the early part of the present century to serve their own needs. Exploitation of the forest continued at an increasing rate and environmental degradation followed as a consequence.

The whole ecosystem in the area is now under extreme stress due to various contributing factors including agricultural extension by the tribals, destruction of forests for timber and fuelwood, illegal poaching of animals and illicit wild life trade.

Previous records indicate that floods were rare in the Burhabalang river but of late it has become a regular feature in the area. The drop of stream discharge during the dry period, silting of hill streams, fall in water table, erosion and gullying and change in micro-climate, all indicate environmental degradation.

Forest fire caused by natural processes and also by the cultivators, hunters and graziers has reached the danger level. Mass hunting by tribals on special occasions and by poachers throughout the year has led to the destruction of flora and fauna to a great extent. Even the tribals themselves are being exploited by the traders, smuglers, money lenders tribal leaders, village priests and others leading to a serious social degradation as well.

In order to save the situation the Government has come forward to preserve the natural resources of the area. In 1956 the area was declared as a National Park for conservation purposes and for the development of tourism. In 1973 the northern part of the area was notified as the core Area (303 km^2) under Project Tiger. The buffer zone around the core was declared as a Sanctuary. Restrictions were imposed on felling of trees and killing of animals and plans were made to shift the tribals outside the forest area.

Such restrictions, however, led to unhappiness amongst the local tribals who depend heavily on forests for their livelihood such as collection of fuel as well as minor forest produce like, sal leaves, kendu leaves, fodder, gum, resine, mohua flower etc.

The environmentalist group has recommended that the area be declared as a Biosphere Reserve with a total restriction on all fellings and concentration of all developmental activities inside the Upland for wild life and tourism only.

However, it must be understood that total stoppage of all fellings and shifting of tribals elsewhere for protecting the environment may help resource protection but will surely create other problems in future. It will run against the policy of economic development with social justice. The tribals form an

an inseparable constituent of the forests. It is difficult to think of forests without tribals and the tribals without forests. Tribals are part of the ecosystem and therefore appropriate techniques for forest management and conservation of the ecosystem should be evolved taking tribals as an important constituent of the forest and then only the plans for proper protection of the environment of the Upland will be meaningful.