

Slope Forms of the Adhoura Plateau in Kaimur District, Bihar

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1. INTRODUCTION

Slopes are ubiquitous elements of the landscape. (King; 1966, p. 17) and so is the case with the Adhoura Plateau. Slope steepness influences rates of runoff, soil creep and soil flowage and the ease of cross-country movement of men and vehicles. Nearly all the land surface slopes in one direction or another and slopes are the fundamental types of land scape features. The entire landscape is the reflection of slope elements and thus the geomorphology of the Adhoura Plateau is largely concerned with the morphometric study of slope.

The study of slope forms has acquired considerable importance in recent geomorphological literature. 'Form applies to what is there, the morphology at a given moment in time.' (Young, 1972, p. 17). The study of slope form done with the help of contours, slope profiles, morphometry and sometimes morphological mapping gives a clear picture of the slope of the ground surface.

2. STUDY AREA

The Adhoura plateau lies between latitudes 24° 30' 35" N to 25° 00' 00" N and longitudes 83° 02' 45" E to 83° 47' 30" E, covering an area about 1550 square Kilometers. The plateau shares 41.75% of the district of Kaimur (Bhabhua) in the State of Bihar in India (Fig. - 1).

It comprises the anchals of Adhoura in full and Chainpur and Bhagwanpur in part. Bordered by the Kaimur scarp on the south and indentation owing to notches and knobs on the north, Adhoura is the name of a southern most anchal of Kaimur district in Bihar. So, Eastern limits of the study area makes the boundary between Kaimur and Rohtas district and its western limit makes the boundary between Bihar and Uttar Pradesh for a distance of about 78 kilometres.

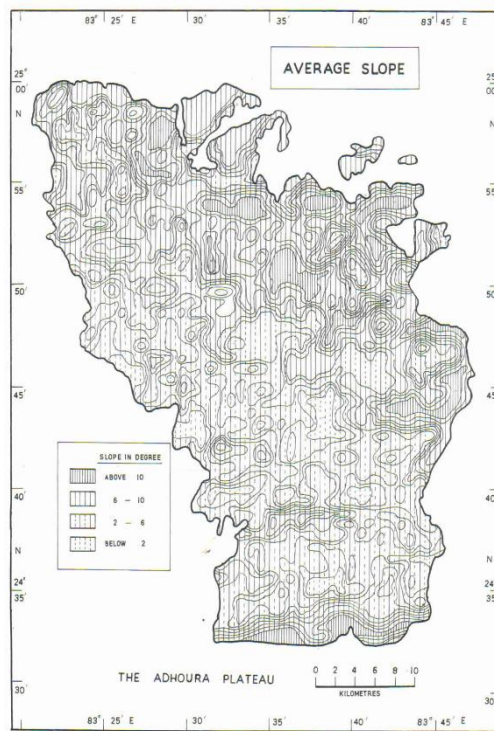


FIG. 2

The Adhoura plateau is included in geomorphic provinces of the eastern continuation of the Kaimur range of Pre-Cambrian and Cambrian Vindhyan sediments consisting of massive stratified sandstones, intercalated with shales and limestones. The Adhoura plateau is not only presenting a highland, but it has numerous fascinating landforms, each speaking their own characteristics and origin. If we take a single feature, scarp, it is sufficient to attract attention of the scientists of geology, geomorphology and other allied disciplines as well as the common observers. It is so steep and inaccessible. Similarly deep cut valleys with almost vertical rocky walls on both the sides notches and knobs, waterfall, caverns and karst features and hills and hillocks are really uncomparable features of the plateau. All these features together are very charming and will attract any one

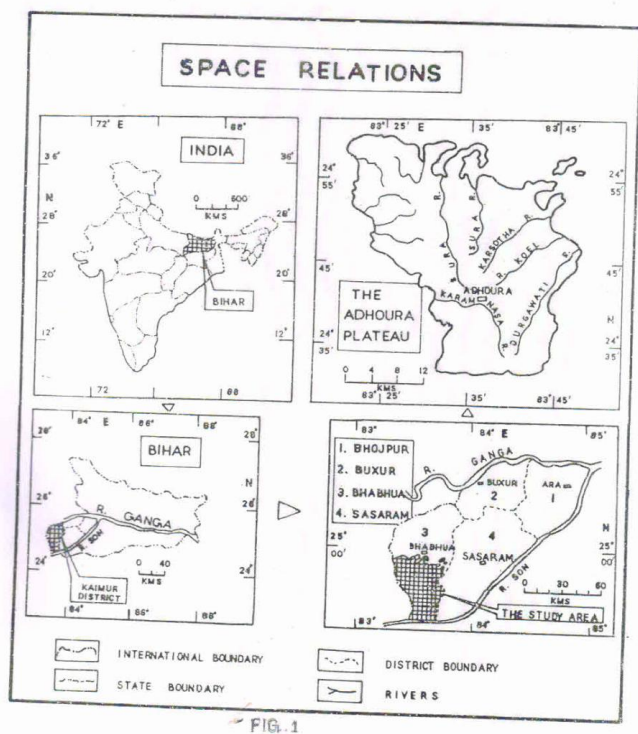
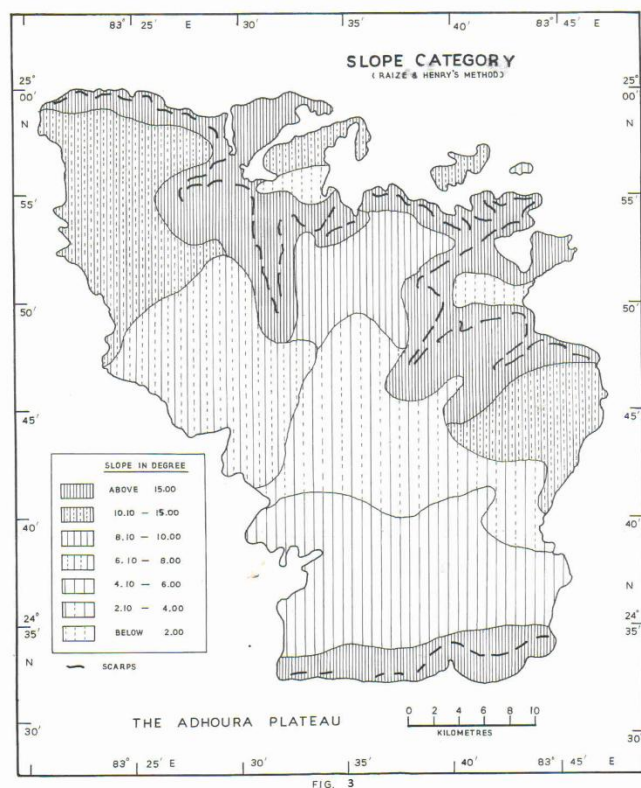


FIG. 1

particularly a student of geomorphology to deal with their evolution and characteristics.

3. SLOPE FORMS :

The slope forms in the study area have been studied by the author by profiling (Fig. 2 & Fig. 3) and contour analysis. During field observation also, the characteristics of slope was analysed. The author has drawn profiles at 5' latitudinal and longitudinal intervals by exaggeration the vertical scale 12.50 times from the normal. An examination of the profiles (Fig 2 & Fig. 3) reveals the following types of slope in the area :



1. Monomorphic slope

(i) Concave slope :

The original scarp slopes might have probably a straight profile top to bottom but denudational processes have modified the slopes in the upper as well as in the lower parts. Since the limestone and shale beds have weathered rapidly, the lower slope profiles have acquired a concave character, the concavity has developed near the debris slope and continues upward for about 20 metres where from the scarp face stands vertically above.

On the subsided valleys also, the hemming slopes make a sharp junction with the valley floor and a clearcut concavity is visible in the junction area concavity is also pronounced when structural controls influence the rate of slope decay. The upper parts composed of hard Kaimur sandstone usually produce straight slope, but the slope starts acquiring concave character in the weak shale and lime stone beds. The Khohs described earlier also exhibit concavity of slopes due to change in the character of rocks. Deposition has also helped in imparting concavity in the slope profiles of the Khohs.

A slight degree of concavity is also visible in the saucer-shaped basins at the top of the plateau. This concavity, however, is due to tectonic activity.

(ii) Convex Slopes :

Concavity and convexity are visible in almost all the slope profiles drawn. While concavity is continued to lower sections of the slope, convexity is a common feature in the upper sections convex slopes in upper parts. Concavity has developed due to rounding of the rim of the plateau by sub-aerial erosion. The rock particles also remain in state of stress and are easily worn away.

In the northern part of the plateau which has been dissected by many rivers, the interstream areas look like high and elongated ridges and all of them have convex profiles at their top.

Although there are no prominent high hills on the plateau top, a few isolated hills are encountered in the northern fringe areas. These isolated hills like Gards Phahar, Dumri, Pahar etc. are completely detached from the main plateau mass and have convex profiles on all sides is the upper parts where lower parts are slightly concave.

(iii) Rectilinear Slopes :

The slopes which exhibit neither concave nor convex character and which are rather straight are classified as rectilinear slopes. A large portion of the scarp slopes between the upper convex parts and lower concave parts are rectilinear. About 50% of the scarps face has straight slopes.

On the Plateau surface where neither depression nor subsided valley (notches & Khohs) are present, the slope is uniform and can be described as rectilinear. The profile drawn (fig 2 & fig. 3) along long 830 35' to 830 45' N. clearly show the rectilinear character of slopes on many parts of the plateau.

2. Polymorphic Slope :

Although many types of slope forms have been discussed in the category of monomorphic slopes, they do not always occur in isolation. They may constitute separate components of a complete slope profile, Ordinarily we find a combination of concave-convex, concavo-rectilinear, convexo-rectilinear or concavo-convexo-rectilinear slope forms.

Concavo-convex slopes occur widely on the plateau surface where stream eroded valleys or saucer shaped depressions provide concavity and the adjoining residual ridges provide a convexity in overall slope forms. At the foot of the scarps also especially in the lower half developed on limestone and shale bed the slope is concave in the lower half and convex in the upper. The cobrahood slope discussed earlier is a fine example of concavoconvex slope forms.

Concavo-rectilinear slope type had developed especially along the subsided valleys in the northern half of the plateau. The slope along the valleys on the bottom are generally

concave. The valley walls are in the form of steep scarps providing the slope rectilinear character. Examples of such subsided valley can be seen in the koel and karsotha valley in the north and north-western portion also.

The convexo-rectilinear slope forms are developed in the southern scarp face especially in the upper half at the junction of the half resistant sandstones bed at the top and the soft shales in the intermediate area. The slope acquire a convex profile and continues vertically upward on sandstones. This

constitute the rectilinear form of slope belonging to this group. This slope can be categorised as convexo-rectilinear slope.

It we take the slope of the scarps from crest to the foot, we get three slope components merging with each other. The lower concave and the middle convex slope merge with its rectilinear components continuing up to the top of the scarps. Therefore we can say that the slope profiles along the high scarps in the south is concavo convex-rectilinear.

References

- [1]. Strahler, A.N. (1956) : Quantitative slope Analysis, Bull. Geol. Soc. AM, Vol 67
- [2]. Young, A (1972) : Some field observation of slope forms and regolith and their relation to the slope development, Trans, Inst. Brith. Geog. Vol. 3.2
- [3]. Yadav, K.P. (2008) : Application of Morphometry in Geomorphology, Radha Publication, New Delhi, pp. 221-233