CHAPTER VII

TERRAIN TYPES OF THE BASIN
The previous geomorphic analysis brings us to the logical conclusion that there are regional variations in the land-forms. This has been the result of several interdependent factors related to underlying geological base and the complex geomorphic history. While entering into the identification of geomorphic regions one gets into complexity and uncertainty regarding the definition and approach. The term landform has been defined by R. A. G. Savigear (1965) as "A feature of the earth's crust with distinctive form characters which can be attributed to the dominance of particular processes of particular structures in the course of its development and to which the feature can be clearly related, on the other hand land form (two words) means only the form of the land". G. S. Smith (1935) defines as "Whatever agencies and processes may have caused the sculpturing or the construction of landform
its resulting configuration that is the principal consideration of the topographer and geographers*.

In the National Atlas Physical Plates, the Physiographic regions on Macro and Micro scale have been identified but even these have not been demarcated, only their names show their location in the region. According to this series the Lower Ken basin falls in the Vindhyan scarp–land and the Bundelkhand upland. In the former, Bijawar hills and Panna range have been identified and in the latter Chhatarpur upland and the Banda plain fall in this region.

Coming to the criteria of regionalization it is not only the average height which is significant but the average slope and the local relief seem to be equally significant, particularly when a small region like Ken basin is being studied. Hammond (1954) has identified the terrain on the continental scale and has used these criteria. But his classification could not be taken up in toto for regional demarcation in a small region. Hence, for micro–divisions factor of slope has been taken into account, for it is very vital for the distribution of agricultural land (Kumar and Sharma, 1980).

Map of the relative relief has been published in the National Atlas (Plate No. 43) on 1:60,00,000 scale in which only five terrain have been identified. Out of these flat, broadly undulating, and rugged terrains fall in the
Lower Ken basin. But while analysing the region under study it seems logical to taken into account the degree of slope as well as the relative relief, for the criteria, for the regional delineation of terrain in such a small area only relative relief does not give satisfactory results. Hammond says "Small scale representation requires that the terrain characteristics upon which the map is to be based be of areas, not simply of individual features". Thus, he has attempted to group terrains into broad categories so that the map may not be confusing. For this purpose also support of slope map seems imperative.

The Quarter inch contour map of Lower Ken basin has been divided into 0° 4' grid and the relative relief has been demarcated. This map has been examined in the light of the National Atlas map of relative relief (Plate No. 43). The former map has been superimposed on the slope map (1" to a mile) of the region which has been prepared by the Wentworth's method. Taking into account the categories of relative relief (Hammond, 1954) and the slope (Symon, 1968) the following categories have been framed. These have been tested in the field which was possible due to the extensive field work.

A little deviation from Hammond's category may be noted here. His second category of local relief is 100'–300'. On the quarter inch maps the contour interval is of 250', hence it seems more logical to take this interval
THE LOWER KEN BASIN
TERRAIN TYPES

ACCORingly TO

HIGHLAND

C 1 - 0

HIGHLY DISSECTED TABLELAND

C 1 - 9

DISSECTED TABLELAND

S 1 - 4

DISSECTED PLAIN

R 6 - 9

ROLLING PLAIN

A 6 - 9

LEVEL PLAIN

1 3 0 3

3 KMS.

4 MILES
for demarcating the relative relief as well.

<table>
<thead>
<tr>
<th>Terrain</th>
<th>Local relief</th>
<th>Slope 0°</th>
<th>According to Hammond</th>
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<tr>
<td>Level land</td>
<td>0-100'</td>
<td>0°-1°</td>
<td>A, 8-9</td>
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<tr>
<td>Rolling plain</td>
<td>100-250'</td>
<td>1°-2°30'</td>
<td>B, 5-9</td>
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<tr>
<td>Dissected plain</td>
<td>100-250'</td>
<td>2°30'-6°</td>
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<tr>
<td>Dissected table-land</td>
<td>250-500'</td>
<td>2°30'-6°</td>
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<td>Highly dissected</td>
<td>500-above</td>
<td>2°30'-6°</td>
<td>C, 1-4</td>
</tr>
</tbody>
</table>

Nearly flat plain or level land: This type of terrain is the most widespread and is found on the northern alluvial plain and middle part of the basin (Map 21). Similar conditions occur in the south-eastern part of the basin, which as a matter of fact, extend in Rewa plateau. This type of terrain occurs in some parts of Rath, Maudha, Mahoba, Banda and Hamirpur tahsils and also in small portions of Panna tahsil. The level plain merges in the rolling and dissected plain in the north and is bordered by the dissected table land in the south-east. The local relief of the level plain is less than 100' and slope of imperceptible 0° and is less than 1°. The general slope of the plain is from south-western to north-eastern. Slope of this terrain is very gentle, about 0°16' from Kartal to Pangara in twenty miles distance. Local height varies from 400' at Mawaijir village to 320' at Umuna. Similarly in the north-eastern portion of the region the
slope decreases from south-west to north-east which is 433' at Karwai and 342' at Rajapur.

The map of terrain of the Lower Ken Basin, reveals that the north-eastern part of the basin is a featureless plain which is formed of the recent deposits. A number of mounds have been developed in this part, due to the level land and alluvium deposits. Bates (1939) has suggested that, on flood plains streams that are 100' in width have a number belt approximately 1600' wide, whereas streams that are 1000' in width have a meander belt some 12000' wide. It is an encroachment into the granite country which is overlain by the river alluvium brought by numerous tributaries of Yamuna from southern high land. In the extreme southern part of the level land the country rock is Bundelkhand gneiss and the rocky surface does not lie far away from the surface. However, the level land is broadly divided into three more or less parallel belts which cover the eastern and western extremities. These belts are the transitional zone between the crystalline country and the new alluvial deep fertile zone and the higher ground near the river Yamuna. Southern part of this is generally undulating, elsewhere the plain is more or less level. A small patch of the level land is eroded by river giving rise to the ravines land and slightly affected the levelness and the fertility of the plain. In the middle part of the basin, where level land is
found, granites often outcrop above the surrounding plain in the form of rounded hummocky hills. This has slightly affected the levelness in the middle part of the basin.

**Rolling or irregular plain**: This is one of the oldest landform, which has developed on the gneisses and granites, and falls in the middle western part of the region. It is noticed from the terrain map (Fig. 21) that there are many areas of homogeneous physical features in the middle and south-eastern part of the region. North of the contour line of 750' the area is a true low land but here also there are a few watersheds or hillocks which have given the landscape of a rolling plain. Degree of slope is not more than 2°30' and relief is also not more than 250'. Local elevation in this part of region is found about 521' at Kishanpur village and 492' near Amarrar village at the middle of the region.

Ever since its formation, the oldest area of crystalline rock has remained a stable mass and resisted for long the effects of weathering and erosion. Due to the long continued denudation it has been reduced to a peneplain and its marginal areas were burried by the alluvium brought by numerous streams coming from the southern high land. The northern boundary of this terrain has been buried under the alluvium and in the south its junction is with the Vindhyan sandstones. It is traversed roughly by 1000' contour. Numerous hillocks rise above
the plain and shallow depressions make it undulating. This region is strewn with a number of big pinkish boulders or 'Tors' which are the peculiar features of the Bundelkhand gneisses. These are found both isolated and in clusters either half buried or fully exposed. Savindra Singh (1977) has suggested the formation of 'Tors' and says "It may be pointed out the tors of Palamau uplands are the results of complex weathering processes and subsequent removal of scree by solifluxion under the influence of rain wash". Similar studies about 'Tors' and gneissic landforms have been done by Chhatarjee, S.C. (1945), Singh, R.P. (1957), Chatterjee, S.P. (1940) and Varma, P. (1957) for Ranchi Plateau. In 'Tors' extensive joints and fractures develop and large boulders are found balancing over each other (Plate 18). Another peculiar feature of this region are the quartz-reef or dykes which run as long narrow serrated ridges. It is noticed that two quartz-reefs running from south-western to north-eastern are other outstanding relief features of the middle western part of the region. Both of these features represent intrusion of igneous matter on a igneous-matter on a massive scale into the Bundelkhand country. On the landsat imageries these dykes could be traced for long distances together. According to Linton (1955) the tors are developed due to the mechanical stripping of the incoherent products of chemical action. While quartz-reefs are believed to be of hydro-thermal origin. Being strewn with a number of tors and quartz-
reefs or dykes the area is formed into a rolling or irregular plains with slight variation in height.

This type of landscape is also found in the south-eastern part of the basin which occurs over Vindhyan sandstone. Below the Bhander scarp land of the region is a widespread plain, an extension of alluvium plain. From this plain rise mesa and buttes which were once part of the scarp land. It appears more reasonable to conclude that this alluvial tract must have been a part of an extensive table land which has been cut intensively leaving residuals here and there.

**Dissected plain**: In between the level plain there are tracts of dissected plain. The dissected plain covers the parts of the Naraini, Karwai, Maudha, Ajaigarh and Laundi tahsils of the region. This area is traversed by the upper courses of the river Chandrawali and Lower courses of the Ken. This is an area of high degree of slope, about 2°30', but relief is not more than 250'. It is dissected into numerous ravines made by the northwards flowing streams. On southern margin of this plain there are a few scattered hills adjacent to the Vindhyan sandstone.

Most probably the dissected plain has developed due to the vertical cutting of the flood plain. This type of plain is at its worst along the lower courses of the Ken river and the Chandrawali, where the gully erosion belt
varies from 10 to 15 miles astride these rivers. This area is an extensive cut by ravines. It is clear that the ravine formation is a process of the catchment area along the banks in the region. From the study of shape, size and pattern of ravines it is clear that the formation of ravines are related to characteristics of soil. It is observed that where the soil is underlain by fine grained clays, which are usually resistant to rapid erosion, ravines do not developed easily. But, where the soil is friable and easily cut by water, ravines have deep. The development of ravines can be explained by another cause i.e. the vertical cutting due to the upliftment of the region. This is evident by the fact that on the bank of Ken the relative height at places is 20', 30', 40', 60'. In Chandrahal the relative height at places is 10', 15', 30', 50'. Thus in the northern plain where the ravines have developed on an extensive areas dissected plains have developed.

Such a dissected plain is also found in the middle part of the basin which are also affected by the numerous streams. As mentioned above, the Ken and its tributaries are rejuvenated streams and are engaged in the down cutting of their courses. This is also true about the middle part of the basin, where the dissected plain has been developed. Besides, this is traversed by two lines of quartz-reefs or dykes which have withstood denudation more successfully
than the granites and stand as wall-like ridges in the
plain. These quartz-reefs and dykes are also responsible
for more variation in the degree of slope. In this part
the quartz-reefs are found at the height from 100' to about
300' above the surrounding plain.

Dissected Tableland: The southern portion of the Lower
Ken basin is a table land bounded by the dissected escarp-
ments and is in two detached portions. One portion of this
terrain type is found at the northern margin of the highly
dissected table land which is found in the southern margin
of highly dissected table land. This peculiar feature of
the region is covered the southern part of the Bijawar
tahsil and the northern frings of tahsils in the Chhatarpur
and partly in the tahsil of Panna. In the dissected table
land local height varies from 250' to 500' and the degree
of slope is more than 2°30'. On the south, separated by a
deep valley from this hilly tract is the vast table land
the altitude being from 1650' at Jerkhdeton to 1089' at
Kandwan.

The most conspicuous feature is the region towards
the northern and southern margin of Panna-Bijawar range.
The northern portion of the dissected table land is formed
in the Bijawar series and the southern is in the Vindhyan
sandstone and shale. The common rocks are sandstone and
limestone and shales which all change their characteristics
with change in their strikes. Southern part of the dissected
table land is scarchely ten miles broad with average height
of 1250'. Sharp ridges, separated by narrow valleys form the water shed. The dissected table land is lower in its eastern corner but gradually gains height in the western part. It is noticed that the elevation of this table land does not exceed 500' above the general level of the plain in the northern part. As mentioned earlier, the slope of the table-land is steep and is usually variable in nature with Messa and Butes. The southern part of this table-land is drained by Burana and Barana nadi, while northern part by Saimri and its tributaries.

Both the dissected table-lands are characterized by the presence of Vindhyan Questas, gorges and a number of rapids and waterfalls. In places where the rivers have cut through the top surface and exposed the Lower limestone and shale beds, especially in the drainage area of Saimri nadi typical shales topography has developed. Such exposures are also found along the northern scarp of the table-land, particularly at places where the rivers Burana and Barana descend down to the plains. In the table-land beyond the southern and northern scarp face, outcrops of the limestone and shales produce some typical dissected table-land. All this discussion brings us to the conclusion that the rivers of this table-land are more active in erosion and revealed the diversified topography as is found in the table-land in the region under study. These rivers follow the structural weakness every where which help in the dissection of the region.
Highly dissected table-land: This landform is the most extensive and important. Highly dissected table-land is bounded by the abrupt and steep scarps and by the dissected table-land. It has a maximum relief of 500' and above and degree of slope is also more than 2°30'. The elevation varies within the range of 1500' to 1750' M.S.L. In general the table-land shows steep northern faces and gentle slope on the southern side. It is noticed that the scarp is most prominent and precipitous, making the plateau inaccessible except through a few gaps or river valleys. In this part the hills and the valleys are traversed by numerous 'nalas' which remain dry for the major part of the year. The Saimri river is the only perennial stream flowing through the middle part of this terrain and it meets the Ken river a little after the Gangau Dam. The table-land is composed mostly of sandstone and this table-land is known as the Bijawar and Panna range, in the Vindhyan scarp land.

There are various reasons for intense dissection which have been discussed in detail in the previous chapter. It is noticed that the table-land has invariably bounded all around by well-defined scarps making it easily distinguishable. It is more acceptable fact that the formation of the scarpland is the outcome of differential weathering of the table-land, giving rise to this terrain.
Thus the most conspicuous features of landforms in the region under study are the scarps or dissected table-lands formed by the two-ranges. The eastern scarp of the dissected table-land is formed by the Kaimur sandstone while the western scarp of Rewa sandstone. The shape of the highly dissected table-land suggests that they have been constantly noted at all the edges by streams and their tributaries everywhere. The dissection is especially important on the Jhiri shales exposed east of the river Ken and on the Bijawar formations in the drainage area of the Saimri river. In the western part of the basin breadth of this landform is uniformly about 20 miles and it runs along the entire length of Bijawar hills in the north. While the eastern part of this table-land reveals less than 5 miles in width. Due to the hard sandstone the dissected table land has been abruptly at the margin.

Results obtained by analyzing the landforms as they exist in their diversified character indicate that the area experienced a series of denudation processes. The various landforms as explained in the above section, have different lithological make up and therefore, the topographic expression of the surfaces evolved have their individual characteristics.

Thus it is concluded that the small scale landform map of the Hammond is so much useful for demarcating the
reatures clearly. Hammond stated (1954) that "The maps show the continental patterns are simpler and more legible at a distance than the physiographic diagram or 'landform' maps and define the nature of the terrain more accurately, especially in areas of low relief, than do small scale maps of the hypsometric tint or generalized shaded relief types".

The terrain map therefore reveal actual features, which could go to make the geomorphic landscape in a region and represent the reality which many a times is obscured in the contour or hachure maps. The identification of terrain types and their mapping goes a long way to explain the geomorphic character of a region.
References:


