Physiographic Characteristics of Ahmednagar Plateau

MAYA UNDE

Abstract : *The appraisal of land resources for any field of planning needs to take into account the landuse land cover condition of the region. This is basically for the reason that it facilitates the understanding of the pattern of utilisation of the land resources. The other factors of significance in land resource appraisal relate to the physiographic and drainage characteristics of the region. The relief of the area determines the availability of land, while the soil in general influences the quality of the land, particularly when the land is being utilised for agrarian activity. With the availability of the remote sensing products in the form of digital data and satellite images the work of land resource appraisal has become relatively easy and moreover it has made available such information, which was otherwise difficult to obtain and or involved tremendous inputs for its collection.*
The present paper is an attempt in the direction of assessing the landuse land cover condition on the basis of remote sensing products and of field visits to different parts of Ahmednagar plateau. The study deals with three important aspects of land as a resource, such as (1) Physiography and drainage characteristics (2) Landuse land cover conditions and (3) the materials particularly the wide spread occurrence of red boles in the region.

Introduction

The management of natural resources always warrants proper understanding of the processes, which govern their availability as well as qualitative characteristics. Most of the natural resources are being utilised for various activities and at different levels of the resource utilisation that keeps on changing from one activity to the other. The land resources are being used ranging from the purpose of occupation of the space such as housing to extraction and removal of materials in the form of mining activity. Between these two extreme levels of utilisation there are different activities for which the land as a resource is being used. One of the most important activities for which land resources are utilised is agriculture. The appraisal of land resource for agriculture needs to take into account the terrain conditions in term of the physiography and drainage, existing landuse land cover condition and the materials, besides its quantification in terms of areal extent. The present paper is a part of an enquiry that has been taken up by the author.

The Study Area

Ahmednagar plateau forms a small part of Balaghat surface forming major water divide in upland Maharashtra separating the Godavari and Krishna drainage systems. Within Maharashtra it is often considered as an interfluve area between Godavari and Bhima basins. The Balaghat plateau in itself is a part of a major planation surface in the Deccan Trap region. Dikshit (1970) has identified it as a planation surface. The planation surface at height comparable to that of Ahmednagar (700 ± 100 m) is rather one of the most extensive surfaces spread in different parts of Western Maharashtra, though it is not a contiguous one. The part of Balaghat surface considered for the present work extends from 19° to 19°.15' N. latitude and 74°.30' E to 75° E. longitude. It forms a part of Parner and Ahmednagar talukas of Ahmednagar district. It is covered in topographic maps 47 I/12 and 47 I/16. These two topographical maps and the FCCs for these map areas formed the basic data for the present analysis besides the observations of the terrain carried out during a number of field visits.

TRANS INST. INDIAN GEOGRAPHERS Vol.23 No.1&2 2001

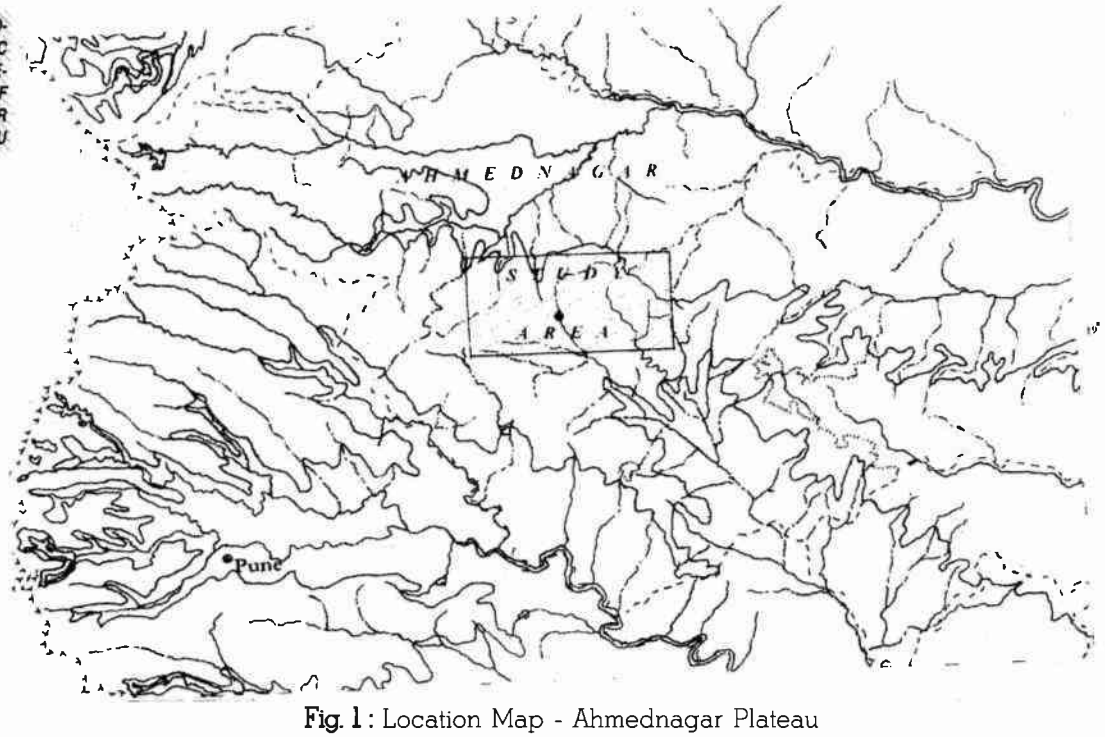

Fig. 1 : Location Map - Ahmednagar Plateau

Physiographic and Drainage Characteristics

The north facing slopes of most of the interfluve areas particularly in the semiarid track of Western Maharashtra are steep as compared to their counter parts facing the south. The plateau slopes along their northern margins are not only steep but at times are abrupt as well. Ahmednagar plateau also displays similar characteristics. The northern margin of the portion of plateau under consideration runs roughly in W→E direction, though at times it has been receded back to a considerable extent by a number of streams maintaining S→N orientation and forming catchment of Mula river, a tributary of Godavari system. For the sake of discussion the area is divided into three zones such as (1) Western. (2) Central and (3) the Eastern. The three zones show distinct characteristic so far as the physiography and drainage of the area are concerned.

The Western Zone

The plateau margin in this zone has an elevation of 600 to 650 m. Tributaries of streams of Karpari, forming part of Godavari catchment, have their origin over the plateau area. The main river maintains W→E trend for some distance from its source. It takes a sharp northeasterly turn and further turns to north near village Bhalavani. A W→E channel of Sina collecting its headwater in hill complex near Jamgaon initially follows SW→NE trend and then moves due east to travel a distance of about 10-12 km before joining the main Sina near Ahmednagar city. The general slope of the plateau is eastward. River Sina and Bend Nala follow the same direction. Most probably, these two streams are faithfully following the average slope direction and more or less appear as consequent streams. The portion of the upper Kapari following similar trend before the sharp turn could be considered to have been forming part of catchment of river Sina. The fairly straight course of river Kapari between villages

Bhalavani and Nimgaon Ghana indicates that it is following a lineament. The possibility of the source segment of river Kapari to have been forming part of Sina basin cannot be ruled out. The author would like to suggest that it is more a result of adjustment of the stream to the structural details rather than a normal case of stream piracy. This is indicated by the following facts

- The course of river Kapari between village Bhalavani and Nimgaon is fairly straight
- The relief in the vicinity of the turn does not show signs of any sort of wind gaps
- The course of Sina (W), shows a proper alignment with the course of upper Kapari

A number of tributaries of Kapari stream maintain SSW→NNE trend almost parallel to the lineament suggesting the existence of a series of weakness in the rock. The eastern most stream of this group, Davalpur stream, is quite interesting. It follows a lineament for a distance of about 6-7 km and then abruptly turns at right angle to flow in WNW→ESE direction. However, in the process it practically blocks and terminates the courses of other streams in the region. Most probably, it is following another weak zone in the form of a lineament perpendicular in its orientation to the one mentioned above. Within the plateau zone these streams have a gentler gradient and their valleys are broad, however, as they move across the plateau margin the valleys become quite narrow and deep. Even the main river, Karpara as it leaves the plateau and runs across the plateau margin deepens its valley and forms a major gorge. It flows over a series of falls accounting for a relief of 18-20 m.

A narrow range, with width not more than 100 m and having a relief of as much as 40-60 m, runs in the NE sector of the zone. This range takes off from Bhagadi hill. The course of river Karpari and its tributaries have breached the range. The elevation of this range is around 700 m. The basal flat is at 640-650 m. This range in most probable condition can be considered to be representing the northern boundary of Ahmednagar plateau.

The northern margin of the plateau in this section of the area is absolutely barren land and is totally devoid of any appreciable soil cover. A visit to this area clearly indicates that the mechanical weathering is predominant and the type of weathering product is in the form of highly angular stones with an average diameter of 2-3 cm They are seen in most of the part of this area. However, these have not been detached and they appear to be in situ products of weathering. They have a rusty brown coating suggesting a mild chemical action. Their shapes and angularity suggests that the flow, of which they are disintegrated products, must have acquired a close jointing pattern.

In the southern part of this zone lies a major range, which rises about 200 m above the average plateau elevation of 600 to 650 m ASL. The highest portion of this range attains a height of 950 m. It is as flat as a tableland and is overlain by mature in situ soils having 50-60 cm depths; with reasonable horizon development. The range has two different arms extending from a high level plateau called 'Kavadya Dongar'. The northern arm forms the margin of Sina (W) river and separates its basin from that of Mendak river. Its high altitude as well as extensive flat ground at the top has attracted a major wind energy project and has as many as 57 towers with height of 60 m spread over a distance of about 15 km.

The Central Zone

The northern part of the central zone, extending north of Ahmednagar City, is occupied by main arm of river Sina. Sina collects its headwater from the hill complex near village Jeur. The river flows in N→S direction. It receives a number of tributaries from the west. From the east, within the area under consideration, it does not have any major tributary. The margin of the plateau in

this part or further eastward is quite different from the one in the Western zone. Major part of this zone is occupied by Ahmednagar city, its westward extension towards Kedgaon village along Pune road, industrial estates in MIDC area to the north of the city and a large number of defence establishment to the east of the city.

The plateau in this part has an elevation of 650-700 m. A number of hills attaining height of 800 m ASL can be seen in these zones. They represent the terminal portions of spurs extending from an extensive high-level plateau system spread over in the Eastern zone. The highest peak in this area attains a height of 901 m., it is locally known as Gorkhnath peak. It is a narrow hill receded from all sides and hence unlike other high-rise areas with comparable height this hill does not have flat land at the top. It is more or less a round top residual hill.

The Eastern Zone

The plateau margin in this area is sharp, abrupt and quite steep. It is characterized by a number of spurs extending on an average for 2-3 km and abruptly terminating into basal piedmont zone. This piedmont zone and the extensive pediment surface beyond the same are highly dissected by a number of small streams. The fall along this margin at some locations is of the order of 300 m but the average fall is around 150 to 200 m. The orientation of the plateau margin is variable to some extent. In the extreme north it is almost due north south. It is roughly west-east for some distance in the central part and then it turns southeastwards in the extreme eastern section.

Just along the margin, the plateau attains a height around 900 m. These heights are comparable to the high-rise plateau and ranges described above from the western zone of the study area. It is 300 m above the average height of the plateau surface. The main hill complex in this area is named after village Agadgaon. This high level surface is quite extensive and measures 6 km along its west-east axis and 10-12 km in north-south direction. It has north-south orientation unlike the east-west trend of Kavadya Dongar in the Western sector. The spurs taking of from Agadgaon extend southward maintaining their identity for about 15 km. The western spur separates the Sina catchment from that of Mehekar stream. Salabat Khan's Tomb, popularly known as Chandbibi's palace, and a shrine of Sufi Saint- Miravalibaba, are located on the high-rise hills along this spur. The Mehakar stream collects its headwaters from Agadgaon plateau and the adjoining hills. The eastern boundary of Mehakar basin in defined by a low-level spur extending in north- south direction and rising above 800 m.

Landuse and Land Cover

The term landuse refers to the pattern of utilization of the land by the population residing in the region, whereas land cover encompasses the naturally occurring materials and objects in the area. The landuse land cover conditions of the area under consideration are ascertained with the help of False Colour Composites (FCCs) of the area. It is also supplemented with the information that could be gathered from SOI topographical maps at 1:50,000 scale. The topographical maps are products of survey undertaken in 1971-72, whereas the FCCs are based on the data acquired on 17th October 2001. A number of field visits to different parts of the study area were conducted in the last year to have the field checks and also to examine the validity of interpretations that were being attempted.

The FCCs available is developed out of the data acquired by LISS III sensor of IRS I-D. The images (fig. 2 and 3) clearly show some distinct land cover conditions. On the basis of broad inspection and the visual interpretation of the FCCs, the following areas can be distinctly identified.

Fig. 2 : IIRS-1D 47 I/16 Oct. 2000, 1:50,000

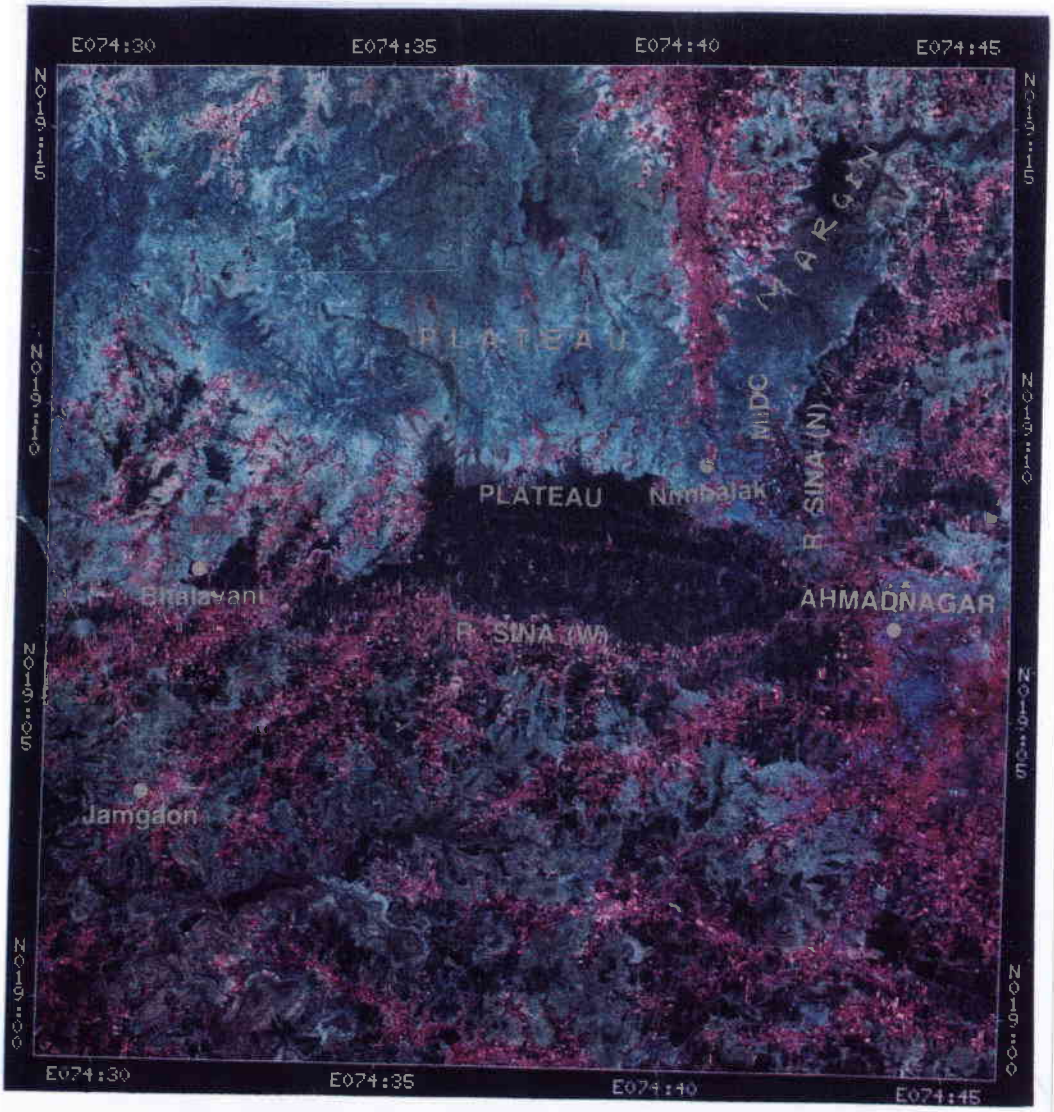

Fig. 3 : IIRS-1D 47 I/16 Oct. 2000, 1:50,000

- The valley zone that stands out due to the natural vegetation they support.
- A vast central black patch representing plateau area as well as a number of patches scattered particularly in the southern parts of the image and the high rise flat surfaces having similar tonal expression
- The settlements- particularly the area of Ahmednagar city and adjoining urban sprawl alongwith the industrial estates to the north of the city.
- The area along plateau margins.

The Valleys Zone

All along the major streams (as well as a few minor ones) in the area one finds that the FCC records varying shed of red colour. However, the nature of vegetation that exists in these areas is neither dense nor continuous. The over all density as well as the spread of vegetation increases in the down stream direction along these rivers. Mostly it is in the form of scattered trees and in some cases bushes attaining heights not more than 3 to 5m. Within this areas small patches with well-defined squares or rectangular shapes having standing crop are also seen. On the topographical map (47 I/12 and I/16) most of the areas is shown by yellow colour indicating wide spread agricultural activity. However, in the FCC the plateau area has dark black shade.

The Plateau Surfaces

Second important region, which immediately stands out in the FCC (fig 2), is a large patch of black colour in the central portion of the region. A close look at the FCCs clearly shows that besides this patch similar black colour patches are to be seen well scattered in the southern portion of the area. These patches are of varying dimension and are having different shapes. By and large the shape of these patches are non-geometrical indicating that their boundaries are natural. Most of the absolute flat areas, either at the average plateau elevations or at the high rise flats about 100 to 150 m above average elevation, are invariably represented by dark black colour. Within these areas the small patches rectangular boundaries can be identified suggesting the existence of agricultural activity.

On the topographical map (47 I/12 and I/16) most of the areas is shown by yellow colour indicating wide spread agricultural activity. However, in the FCC the plateau area has dark black shade. A field visit to this plateau area in this period (October) taking a transect from Nimblak to Bhalavani and Jamgaon was arranged to carry out the field checks, particularly for finding any explanation to the dark black colour observed in the central portion of the map area. The black colour of the plateau areas as well as the high rise flat may be attributed to the fact that it is fallow land. Though on topographic maps it is shown as area under cultivation, it may be noted that the image is a product of data acquired in the month of October. The main season of agriculture activity in this area is of Rabi- (winter) and the crop taken is sorghum. The density of crop in October is too low due to the fact that the crop is just few weeks old, even if one considers September as the sowing season. At times the sowing activity is delayed and under such conditions the crop could be quite young in the month of October and the major component contributing to the reflection from the ground will be the soil. The plateau has deep black soils, and hence it is not surprising that in most of the areas the plateau tops are appearing dark black patches of varying dimensions and shapes.

The Plateau Margins (and Hillside Slopes)

The plateau margins as well as the slopes of high-rise hills in the area forms another distinct zone well represented in the FCC. One may have to group these plateau margins into different categories depending on the colour differentials as observed in the FCCs as well as the observation of the terrain carried

out during the field visit for the ground checks. These could be stated as

1. Northern margins of the plateau in a) western and b) eastern zones
2. The hill side slopes of high rise flats and the spurs extending from them

1a. The northern plateau margins in the western part of the study area are represented by bluish colour with a number of patches where the colour assumes whitish tinge. The area is totally barren, and a number of streams have carved tiny valleys dissecting the area to a considerable extent. These valleys are quite narrow. The valley side slopes do not have any soil cover and the rock is well exposed. However, the rock is highly weathered though the weathered products, in the form of angular pieces, still hold on to the surface. As noted above, the close jointing in the rock has been responsible for intensive mechanical weathering and the size of the angular pieces is about 2-3 cm. The area has a total sterile look. On the topographic map large part of this area is marked as 'Stony Waste'. It does not support any kind of vegetation- not even grass cover.

1b. In the east the plateau margins, as mentioned above, have a steep and abrupt drop. The relief along this margin is at places over 300 m. A number of spurs of restricted length take off from this margin and abruptly terminate into the wide pediment surface at the base. The pediment surface is occupied by a number of streams supporting vegetation. As a result in this section of the area except along the terminal slopes of the spurs the area does not have the bluish colour suggesting of stony waste conditions on the contrary these areas record dark gray shades.

2. The slopes of the spurs extending from the high-rise flats over the plateau region have a dark greyish shade. Most of the material in this part is in the form of unconsolidated regolith, or at some sections material from red boles that has spread over the region. In the eastern zone the slopes of the spurs extending are represented by darker shades of grey colour. Interspur areas in the eastern section support fairly dense vegetation.

The Settlements

Though there are a number of settlements in the image area due to their small size these do not get distinctly represented on FCCs. Ahmednagar City and its extensions, however, can be easily identified. This urban area is represented on FCC by a sizeable patch of blue colour with granular texture. The old township as well as its spread to the north can be distinctly observed. A close look at the area also indicates recent development all along. Pune road to the southwest of the city and also the MIDC area in extreme north.

Syrface Materials

The land forming materials in this part of the area need particular mention. Most of the plateau area has in situ black soils with proper horizon development. The average thickness of the soil profile is around 50-60 cm. In many cases where the soil profiles are exposed, a thick layer of calcareous material is found. This is quite a common feature of the soils in the semiarid tracts (Jog, 1985). In areas, which have been prone to erosion and where the topsoil layer is either removed or has been reduced considerably in terms of its thickness, have greyish soils. This is normally seen along the slope of high-rise flat surfaces as well as the slopes of the plateau margins in the northeastern zone.

The wide spread occurrence of red boles in this area needs a special mention. The red boles are quite known from the Deccan Trap formations possibly as the intertrappeans, which have been subjected to tremendous heat of the subsequent eruptions. However, their occurrence in different parts has been quite random and of limited extent. In this part of the plateau they are spread over large areas

and attain a thickness as much as 3-5 m. These are normally well exposed along the slopes of the high-rise flat areas mentioned earlier. At locations where the top layers of basalt have been removed, the material from the red boles has spread over the adjoing areas and the soil in this part have been turned quite infertile. The red boles with noticeable thickness as well as areal extent are reported from Saiban area north of Ahmednagar city, Karjune Khare village on the northern margin of the plateau, the eastern slopes of high-rise surface near Jamgoan etc. The variations in the nature of these materials, their wide spread occurrence as well as the variations in the elevations of different layers of red boles need a detailed enquiry.

Acknowledgement

Author would like to express her gratefulness to Professor S. R. Jog, Department of Geography, University of Pune, for his valuable suggestions during this work and his participation in a few field visits. The committed support and constant encouragement that I have received from of Prof. M. A. Shaikh, Head, Department of Geography Ahmednagar College, Ahmednagar.

References

Dikshit K. R. (1970) : Polycyclic Landscape and the surfaces of erosion in the Deccan Trap country with special reference to Upland Maharashtra. *National Geographer Journal, India Vol XVI*

Dikshit K. R. (1986) : *Maharashtra in Maps.* Pub. Maharashtra State Board for Literature and Culture. Bombay

Gazetteer of India (1976) : *Maharashtra State, Ahmednagar District.* Bombay Gazetteers Department, Government of Maharashtra, Bombay

Jog S. R. (1985) : The Geomorphic analysis of Upper Bhima Basin. *Unpublished Ph. D. Thesis, University of Pune, Pune*

Dr. Maya Unde
Department of Geography,
Ahmednagar College, Ahmednagar
(mayaunde@yahoo.com)