REVIEW OF RESEARCH

STUDY OF GEOMORPHOLOGY OF SAPTALINGI BASIN, MAHARASHTRA

Dr. Surendra C. Thakurdesai

R.P. Gogate and R. V. Jogalekar College, Ratnagiri.

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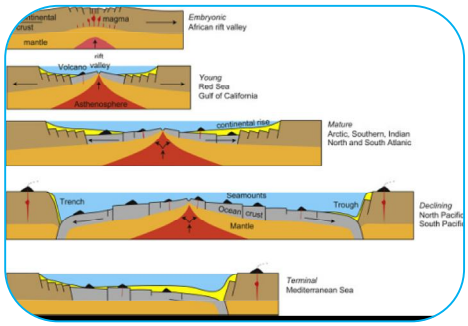

ABSTRACT:

Konkan is the area known for the lateritic lithology. Morphology of this region is controlled by lithology. The region is characterised by flat plateau tops, moderate marginal slopes and narrow valley floors. Plateaus dominate the scenario covering maximum area. They are capped by lateritic duricrust. The slopes are occupied by lithomarge and colluvial material where as the floors are made up of sediments brought by streams as well as over the slopes.

The characteristics of laterite govern the development of landforms in this region. Very high porosity and chemically inert nature of this laterite proves to dominate the landform development. Because of high porosity large part of water percolates down and very little amount is left in form of surface flow. This meager amount of water flows over the surface. As the amount of surface flow is small there is dearth of energy which reduces the amount of work done by the stream. Therefore drainage development follows different trend in this region. The inertness of duricrust to chemical action reduces rate of breaking down. Therefore the basins in this region differ from rest of the basins lying over the Deccan plateau.

KEYWORDS: *Stream network, Fluvial morphology, Laterite*

INTRODUCTION : River Saptalingi is a small 6th order steam in Sangameshwar tehsil of Ratnagiri district. It originates near Village, in Tikleshwar hills to the East of Devrukh town. The length of this river is Kms. It joins the Bavriver near Village Manaskond. The catchment area of this stream is Sq. Kms. The shape of catchment is elongated. Major tributary streams joining this river are

Rivers are most common and active agents of landform development. They occupy almost all surfaces. The development of stream network is a function of number of parameters like lithology, amount of rainfall, surface flow etc. The study of basins is done to understand the past and future of region.

Review of literature – The drainage basins are most widely studied geomorphic units all over the world.The river basins in laterite are studied by Thomas in Africa. A detailed account of river basins in Konkan is given by Dikshit, The landforms associate with fluvial work are described by Karlekar. Sakurkar, Sahasrabuddhe, Kulkarni have studied Konkan laterites for their characteristics. Thakurdesai ha staken account of plateau surfaces in South Konkan.

Materials and Methods - The present study shall incorporate following data sources -

1. S.O.I. Toposheets
2. Satellite Image
3. Cadestral maps
4. G.S.I. manual
5. G.S.D.A. hand book

The study shall follow the standard methods of Drainage basin analysis, morphometric analysis. Additionally geomorphic mapping of the area shall be done. Sediment sampling shall be carried out and grain size distribution analysis shall be done. Study of valley development shall be done by studying cross sections of the basin. Detailed measurement of discharge, energy and movement of material

shall be done.

Expected outcome –

The fate of Konkan is governed by the lithology. The study of this kind shall contribute to deeper understanding of the fluvial processes operative within this part of the country. The study shall help in suggesting a model for water management in this region. Additionally the process study shall help in knowing the sedimentological processes.

KONKAN LATERITES, TECTONIKS AND SEALEVEL:A LITERATURE SURVE

The konkan region on west coast of India has been widely studied and referred to by many workers in India and abroad Frist reference about this region dats back to 1851 [Buist ,1851].

Wilkinson in 1871 gave a sketch of the geological structure of the region according to him the northern part of the then Ratnagiri district is composed of trap rock covered by laterites that continue inland up to an altitude of 200m. ASL. Wilkinson reported that "at Ratnagherry, in well and other Section, the trap is found to be overlaid by thickness of few feet of white clay, imbedding fruits and containing thin carbonaceous seams; composed for the most part of levels. This separated from soft laterite above by ferruginous band about an inch thick having much the appearance of Hematite. It is vesicular the cavities being filled by quartz. the soft laterite soil above hardens on exposure."

Gourou (1961) has described the laterite landscape of Konkan as a "Pedological Leprosy." The other studies along with that by Wilkinson consist reports by Wingate (1852), Suryanarayana (1970), D'souza G (1968),Agrawal and Guzder (1972), Dikshit(1976) and Karlekar(1981).

The laterilte in Konkan extent form Sahyadriancrestline to the Arabian Cost the eastern high level laterites are considered to be primary in nature while western are secondary (Karlekar,1981). Three different altitudes can be identified as regards formation of lateritic Surfaces. They occur at the height of 40 to50 m., 60 to 90 m., and 150 to 200 m. There is a also a surface at 300 to 600 m. Along the coast line the 40 to 50 m. surface is very near the coast line has gentle westward slope. Another very conspicuous surface in the region is at 100m.ASL. (Karlekar 1981)

The laterites of Konkan can be described under the term 'Ferricrete' as proposed by Goudie (1973), as the Iron content of laterites is about 30% (Karlekar1981).These laterites also have Aluminum or both. The laterites in this area are comprised of highly weathered material through the process of leaching they become vesicular or porous. The average size of pores is about 15 to 20 m. m. (Karlekar 1981) .The laterites found at 40 to 50 m attitude and detrital or secondary in nature.Guzder (1975) described the secondary laterites as mainly comprising of lateritic washes and slop debris which have subsequently been so thoroughly relaterised as to be indistinguishable from true laterite

The thickness of laterite deposits is also measured by many scholars. The primary laterite in Konkan have developed profiles of more then 15m inclusive of weathered Basalt, lithomarge and laterite clay .The secondary or pseudo-primary laterites show thicker profile having 20 and 40 m thickness (Karlekar 1981).

STUDY AREA

The area under study essentially comprises of river channel and its valley. It is known as Saptlingiriver and stretches between Harpude and Tale-Kante villages. The origin is at minor water divide near Harpude. It forms confluence with river Bav near village Tale-Kante. The total length of river is 26 km. The major tributaries are Chornadi and DhamapurStrem. This river is a sixth order stream near confluence and in study area. The study refers to The length of the channel flowing through Tale-Kante village. This is last stretch of the river. The length channel studied is 0.85 km The minimum width in this section is21 m. where as maximum width is 70m. The channel is meandering in this section. At the time of visit that is summer the channel was largely occupied by bed load consisting of coarse sand and gravels. Water was present as a streamlet occupying a small part of the channel. The river being perennial in this section water was flowing through small pools of water was seen at two or three places. The sand bars were of two types -

1. Point bar
2. Mid bars

Large parts of bar was covered with riparian vegetation. Looking at the size of trees it can be judged that the bars are permanent and stationary.

The analysis of sediment shows that coarse sand dominates the sediment. It indicates the high energy available with the stream for carrying the sediment. The deposition is so conspicuous because there is sudden fall in the velocity of water near confluences, where ponding effect is seen in Saptlingi River. As it is a tributaries of major stream like Bavriver the flushing of water and sediment through this channel depends on status of main channel. With sharp fall in velocity it becomes difficult for a stream to carry the sediment and therefore the channel is filled with large volume of sediment. Within this channel there is definite pattern of distribution of sediment. The outer banks are free from deposition and generally have pools. Along them were as the inner banks are occupied point bars.

VALLEY SECTION

AS the river flows through a typical lateritic terrain it exhibits certain characteristic features. The valley is separated by flat plateau acting as water divide. It is made up of lateritic duricrust. There is a sharp contact between the plateau and slope. Slopes are moderate with an angle of 30 to 45 degrees. They are covered with sediment and are vegetated. The length of slops is around 80 meters. Valley floor is narrow and disrupted many a times. It is present on one side of the valley. The width varies between few meters to half kilometer. The floor is used for agriculture. The banks are steep cohesive and stable. The height varies between 0.1 to 3 meters. Overall the profile is moderately steep and resembles a box. One can imagine it to be an entrenched meanders. The section of main channel Bav river is under tidal influence .

LATERITES: LANDFORM AND LAND USE

The study area is a classic example of how landform development and landuse systems are dictated by lateritic cover. Laterite dominates the landscape of the area wise as well as process wise. The plateaux are covered by lateritic cap for about 72% of their area. The physical and chemical characteristics of the laterite control the geomorphic processes such as weathering, slope and drainage development, ground water & its fluctuation. These in turn control the distribution of soils and vegetation in the area. The pattern of landuse is a function of the influence of all the factors mentioned above.

The laterites in the study area are ferruginous with pisolitic infillings. They are chemically inert to the process of weathering at the same time their highly porous nature allows a large part of precipitation to infiltrate, thus reducing the effect of running water on the weathering. (Dikshit, Karlekar 1981). These two attributes together almost retard the process of weathering in lateritic areas like Tale-kante. The only dominant form of disintegration of laterite in this area seems to be marginal disintegration. The marginal disintegration is result of spring sapping and caving just at the base of the lateritic crust. The marginal disintegration causes dislocation of laterite in form of blocks. These block slide along the slope and could be seen resting on the marginal slopes, valley sides, in the stream beds, at the base of the cliffs and even on the shore platforms.

The lateritic duricrust forms the capping over the lower Lithosections. The cap protects the lower strata from sub-aerial erosional processes and restricts the slope development, which is very slow in the region.

Lower parts of the slopes are rectilinear but the middle sections often show convexity produced by the wash material as seen at Tale Kante. The slow rate of slope development affects the valley development especially valley widening by streams (Dikshit). The stream Saptalingi has narrow valley and narrow valley floors. The valley slopes are steep & are mainly a result of headword erosion, which is evident from their long profiles (Dikshit).

As the laterite in the area is porous the rate of infiltration is very high. This high rate of infiltration makes meager water available as surface flow. As the surface flow is meager the large part

flows as sheet itself. Very few streams have developed over the lateritic surfaces. The streams are seasonal, shallow & do not produce well-defined channels. The stream development being very weak the branching is also restricted. Network of tributaries is rarely developed.

The ground water shows wide variation over the plateau. In area water table is 45 m. deep. There is also a seasonal change in the water table. The laterite being highly porous has very rapid recharge. The wells are filled completely in the monsoon but with the retreat of monsoon the well water level drops rapidly. The spring level fluctuates with monsoon. The central part of plateau has comparatively shallow and permanent water table while marginal areas to the south, east & north the aquifer is deeper and water is scarce.

Near circular depressions of variable size on lateritic surfaces is another striking feature. These depressions are shallow & many a times covered by thin layer of regolith. The circularity of these depressions and their sharp edges make their appearance very striking.

Vegetation is restricted to smaller patches where the soil and water conditions are conducive. Small bushes and shrubs grow on the lateritic plateau near margins where cracks are developed due to marginal disintegration. Bushes also grow along the rim of the depression. Grass grows in small depressions & ditches in monsoon but it perishes very fast just after the monsoon. Relatively dense vegetation is seen growing in stream valleys. It is manly mixed deciduous forest which is now being replaced by mango plantations.

LAND USE AND LANDCOVER

The key factors in controlling landuse in area are lithological and hydrological. The availability of soil, moisture and water are the prime internal factors while the development of transport network, nearness to Ratnagiri are the external factors playing a key role in deciding the landuse and the change in it over time.

Earlier landuse was totally governed by internal factors. The village Talekante is located on the terraces at the foot of the plateau. The terraces have ample supply of groundwater. The prime land use of the terraces was agriculture. These days however the agriculture is being replaced by mango plantations, which are economically more profitable.

Landuse and landcover of lateritic plateaus

No.	Landuse	Talekante Village
1.	Barren	38.3
2.	Old Villages	9
3.	Agriculture	24.3
4.	New Housing	9.5
5.	Quarrying	8
6.	Natural Vegetation	19

(Figures in %)

The plateau top was never conducive for agriculture and was mostly barren. Depressions with thick regolith cover only were used for growing paddy. They are still used for paddy cultivation. The grass was used as fodder but a large part of the plateau area was unused.

This change is more prominent over the barren lateritic plateaus. The reason for near inertness to change in the villages and was that the landuse was very intensive there was no scope for further areal growth. In contrast the use of plateau surface was almost nil.

There are however many undeveloped, barren patches, scattered between housing schemes. Inertness of laterites to any agricultural development except tree crops has prevented these areas from further change in landuse.

REFFERENCE

Aleva, G. J. J. (1994) Laterite, Concepts, Geology, Morphology and Chemistry, Comp. By Aleva, ISRIC, Netherlands, pp 169

Goudie, (1973) *Duricrust in tropical and subtropical landscape,* Clarendon Publication, Oxford.
Karlekar, S. N. (1981) A geomorphic study of south Konkan, Unpublished Ph.D. thesis, University of Pune, pp 47.
Powar, K. B. (1993) Geomorphological evolution of Konkan coastal belt and adjoining Sahyadri uplands with reference to Quaternary uplift, *Current Sci. Vol. 64*, no. 11-12, pp 793 – 796.
Rajguru, S. N. and Marathe, A. R. (1984) Neotectonic activity around Ratnagiri W. India, *Proc. Symp.Quat.Episodes*, Dept. of Geol., M. S. University, Baroda.
Schum, S. A. (1956) Evolution of drainage system and scopes in badlands at Perth, Anboy, New Jersey, *Bull. Geo. Soc. Ame*. Vol. 67.
Sedimentary Geology 1, Amsterdam, pp 7 – 56.
Trendall, A. F. (1962) The formation of Apparent Peneplains by a process of combined laterisation and surface wash. (ZFG 1962).
Wadia, D. N. (1966) *Geology of India,* 3rd ed. McMillan, N Y, pp 536.
Wilkinson, C. J. (1871) Sketch of Geological structure of southern Konkan, Records of G S I ,Vol. 4, pp 44-47.
Wingate, G. (1952) The Laterites of South Konkan and Southern Mah.