



“GEOMORPHOLOGY AND LANDUSE STUDY OF BHAUNAK RIVER BASIN, MAHARASHTRA”

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Abstract:

Bhaunak river is a northern tributary of river Tapi covering an area of 240.5 sq.km. It lies between 21°05'N to 21°10'N latitudes and 75°30' E to 75°45' E longitudes. It is located in the northern part of Jalgaon district of Maharashtra state. The present basin is selected for the study of impact of geomorphology on the general landuse. The main objective of the study is to identify major geomorphic units on the basis of study of landforms and soils to correlate them with the landuse. This work is carried out by using IRS-IB Geo-Coded and LISS-III data on the scale 1:50000. Major landforms of the study area were identified and classified into denudational, fluviodenudational and fluvial. Major soil types of river basin were also identified and correlated them with landuse pattern of the study area. The study reveals that the hills of Satpura are covered with vegetation, the piedmont plane is brought under pasture and animal grazing. Whereas the flood plain is under intensive cultivation of cash crops like banana, cotton, sugarcane and chilly. There is a deep gully erosion along the mouth of the river forming the ravines.

Key Words : Geo-Coded data, Geomorphic units, Denudational landforms, Piedmont Plane.

Introduction:

Bhaunak basin forms sub basin of river Tapi and it is located on the northern bank of river Tapi. It is a small basin occupies an area of 240.5 sq.km. It lies between 21°05' N to 21°10' N latitudes and 75°30' E to 75°45' E longitudes, lies in the northern part of Jalgaon district of Maharashtra state. The catchment area of the basin is occupied by hard rock formation and alluvial formation. Formerly this area was with excellent ground water potential but excessive withdrawal of water for irrigation has depleted the rich ground water aquifer. The study area lies in the semi arid climate having average annual rainfall of 640 mm. The important soils of Bhaunak basin are piedmont soil, courser soil, alluvial soil and deep black soil. A major part of the basin is under the cultivation of cash crops like banana, sugarcane and cotton. The study area can be divided into four major geomorphic units i.e. the hill slope, piedmont zone, alluvial plane, valley fills and ravines land.

In the utilization of the land, the climate, physiography and geology plays an important role. The planning of land development particularly the landuse planning is related with geomorphological study of the river basin. Ali Mohammed (1978) has taken an account of landuse classification on the basis of slope, erosion, soil texture, soil fertility and landuse.

Study Area:

Bhaunak basin forms sub basin of river Tapi and is located on the northern bank of river Tapi. It is a small basin occupies a drainage area of 240.5 sq.km. It lies between 75°30' to 75°45' E longitudes and 21°5' to 21°25' N latitudes, covering part of Jalgaon district of Maharashtra (Fig.No.1). The river rises in Satpura mountains and flows in southern direction and joins to river Tapi. The catchment area is occupied by hard rock formation and alluvial formation. Northern part of the basin is formed by the piedmont zone (Borse & Agone, 2013).

Hypotheses:

- i) The stratigraphy of study area is favorable for ground water development and can be used for better landuse practice.
- ii) The geomorphic setup of Bhaunak basin controls the landuse pattern.

Methodology:

The morphometric analysis of Bhaunak river is completed by using Horton's (1932) methodology. Survey of India (SOI) toposheets no. 46 O/11 and 46 O/12 on a scale 1:50000 were used

R. J. Borse

for this purpose. The slope analysis was done by using Wentworth's method of determining average slope of the basin. With the help of above methods the linear areal and relief aspects of the basin were calculated. The hydrogeomorphic units, soils and landuse were interpreted by using IRS-IB Geocoded data on the scale 1:50000, which was supported by the detail field work.

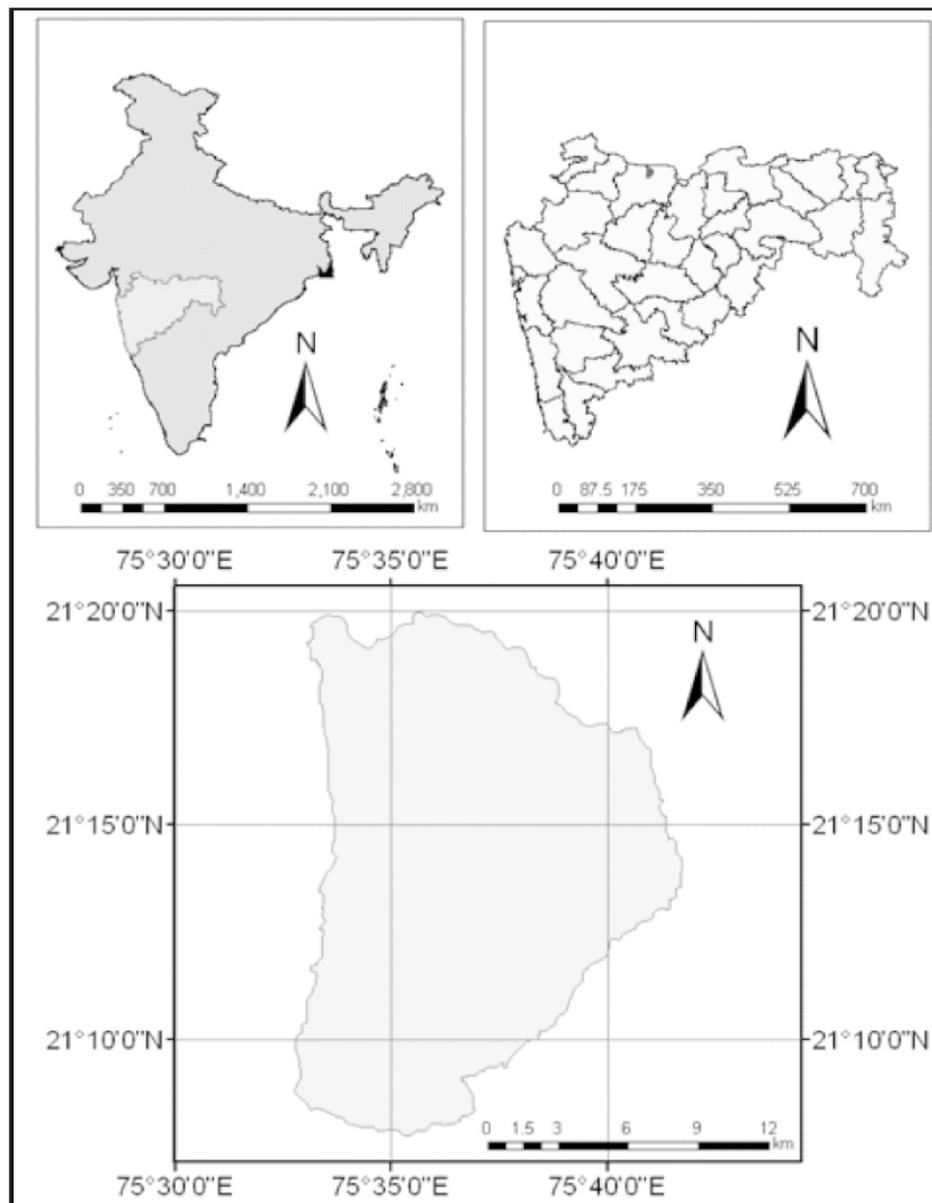


Fig.1: Location Map

Results and Discussion:

Geomorphology:

The geomorphology of any river basin includes the systematic investigation of landforms, their origin, processes and the underlined structure. The geomorphological study of the basin also helps to know the geohydrological characteristics of the basin like surface runoff, porosity and permeability of rocks. (Fig.2). The morphometric analysis of Bhaunak river basin was studied including stream order, stream number, stream length, bifurcation ratio and length ratio. Which have been summarized in the Table No.1.



Fig.2.

Table-1 : Morphometric Parameters of Bhaunak River Basin

Stream order	No. of Streams	Stream length in Km.	Basin area in sq.km.	Bifurcation Ratio	Length Ratio
I	Nu	Lu		Nu/Nu+1	Lu+1/Lu
I	316	270.54	136.903	3.80	0.48
II	83	131.14	186.135	4.61	0.53
III	18	70.17	209.398	3.6	0.51
IV	05	36.48	222.520	2.5	0.59
V	02	21.62	240.302	2	0.04
VI	01	0.95	240.500	--	--
Total	425	530.90			

Slope :

The slope analysis of Bhaunak basin has been calculated with the help of Wentworth (1930) average slope method. The study area is subdivided into six categories of slope. The first category of slope includes the black soil, alluvial plain and valley fills. The second category of slope ranges from 10 to 70 which is found in the belt of alluvial deposit. The third slope category varies from 70 to 140 which is found in the lower part of the basin. The fourth category of slope ranges from 140 to 170 which covers the foot hill zone of the upper part of the basin (Fig.3).

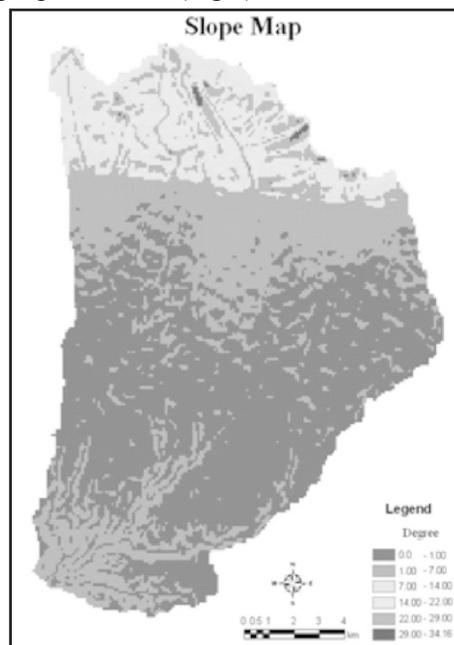


Fig.3.

R. J. Borse

Soils:

The important soils of Bhaunak basin shows typical distribution the deep black soil occurs along the southern part of basin. Whereas thick alluvial soil occurs along the flood plain. The piedmont zone is having accumulation of courser soil mix with gravels. The insitu soil occurs along the slope of Satpura mountain. (Fig.No.4A,B).



Fig.4A



Fig.4B

Landuse:

The present study of landuse of the basin reveals different categories of landuse the important categories of landuse identified are cultivated land (wet), cultivated land(dry), waste land, fallow land, shrub forest and ravines. The cultivated land (wet) is found in the alluvial plain which is under well irrigation. The dry cultivated land founds over the piedmont zone. The patches at the foot hills are the wasteland and the fallow land (Fig.5). The impact of geomorphology on the landuse has been summarized in the Table No.2.



Fig.5.

R. J. Borse

Conclusion:

There are six major geomorphic units in the study area.

The bhunak basin is fifth order river basin.

The landuse is controlled by geomorphic units.

The agricultural land can be reclaimed in the ravine area. Table-2 : Land Capability of the Bhaunak River basin

Sr. No.	Class	Land Units	Slope	Soil Fertility	Ground Water Potential	Present Land use	Erosion Susceptibility	Land Development Activity
1.	I	Alluvial Plains	.	Very Good	Excellent	Cultivated land, Banana, Cotton, Vegetables	Low	--
2.	II	Valley Fill	<2°	Good	Very Good	Cultivated Land	Low	--
3.	III	Shallow Weathered Pediplains	2-5°	Moderate to Good	Good	Cultivated Land, Wet and Dry Banana, Cotton, Corn.	Moderate	--
4.	IV	Pidmont Zone	<5°	Moderate	Fair	Cultivated Land, Wet and Dry, Banana, Cotton, Corn.	High	--
5.	V	Badland Zone	2-5°	Good	Good		--	Leveling
6.	VI	Hill Terrain	>15°	Poor	Run off	Forest, Shrubs	--	Afforestation Contour Bunding

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