Vol 4 Issue 11 Aug 2015

ISSN No : 2249-894X

Monthly Multidisciplinary Research Journal

Review Of Research Journal

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RNI MAHMUL/2011/38595 **ISSN No.2249-894X**

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Review Of Research
ISSN 2249-894X

Impact Factor : 3.1402(UIF)
Volume - 4 | Issue - 11 | Aug - 2015

TERRIAN ANALYSIS OF VENNA RIVER BASIN (SATARA) MAHARASHTRA USING GIS TECHNIQUES

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ABSTRACT

In present paper attempt to Terrain characteristic of Venna River Basin using Geographical Information SystemTechniques. Terrain analysis are important in geomorphology. The Venna basin is located in the Western Ghats and is a part of the Deccan traps. The river Venna which is located at 1411 m. above the sea level (ASL) is a major tributary on the right bank of Krishna River. The total area of the basin is 334.65 sq. km, and it falls in the Survey of India (SOI) Toposheet No 47G/2, 47 G/9, 47G/13, 47G/14, 47K/2 for watershed boundary. Delineation base map preparation is on 1:50000 scales and its perimeter is 125.7489 km. The total length of the river channel is 60.133 km from its origin at Venna Lake to confluence of Krishna river.

KEYWORDS :*DEM, Slope, Slope aspect, etc.*

1.INTRODUCTION :

Terrain consist of the physiography ,lithology, morphometry, soil geography and to some extends land cover (Meijerink,1988). The hydrological characteristics of a river basin can be interrelated with the physiographic characteristics of the drainage basin, such as size, shape, slope, drainage density and length of the streams, etc. (Lobeck, 1939, Thornbury, 1954, Chorley 1969).

2. LOCATION OF STUDY AREA-

The study area includes the mountainous region of the western part of Deccan plateau in Satara district. This watershed is located at a latitude of 17º 54' 12" N to17º 47'00" N and a longitude of 73º 37'00" to 74º 03' 00"E.

The total area of the basin is 334.65 sq. km, and it falls in the Survey of India (SOI) Toposheet No 47G/2, 47 G/9, 47G/13, 47G/14, 47K/2 for watershed boundary. Delineation base map preparation is on 1:50000 scales and its perimeter is 125.7489 km.

The total length of the river channel is 60.133 km from its origin at Venna Lake near Mahabaleshwar to its confluence with Krishna River (Sangam Mahuli) near Satara. The catchment area of its basin extends in the western– eastern direction.

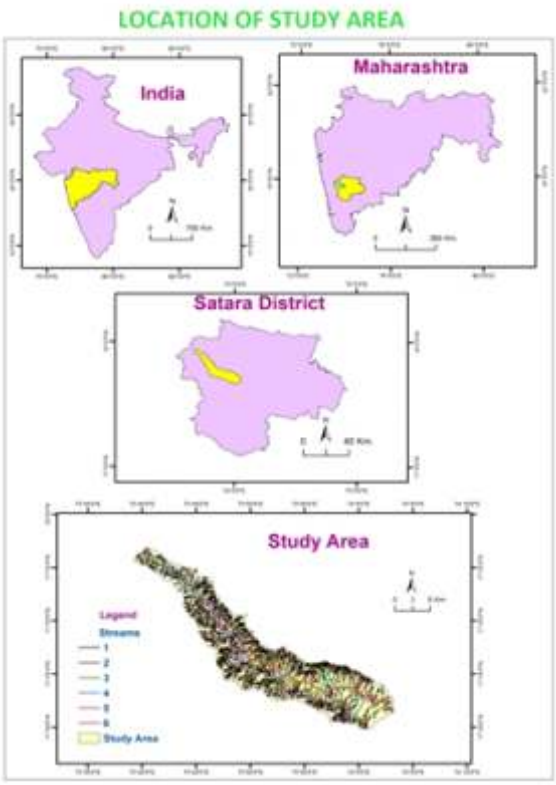

Fig.No.1- Location Map

3. METHODOLOGY -

The present study is based on the Survey of India Toposheet (47G/2, 47G/9, 47G/13, 47G/14, 47K/2) at 1:50000 scale map. It was scanned and georeferenced with appropriate projection parameter (Universal Transverse Mercator Projection UTM, Zone 43 N and Datum GCS.WGS.1984). The Survey of India Toposheet at the digitization work has been carried out for entire analysis of the basin using GIS software (ArcGIS 9.3). Stream, contour line are digitize in ArcGIS Softwareand preparation of the DEM map, counter map, slope map, aspect map, of Venna basin. Contour interval of Toposheets is 20 meter.
ANALYSIS –

4. RELIFE -

The Venna basin is located in the Western Ghats and is a part of the Deccan traps. The river Venna which is located at 1411 m. above the sea level (ASL) is a major tributary on the right bank of Krishna River. In this basin is more rugged and with undulating topographical characteristics. There are several notable hill and hill forts in the basin. The slope is bare and steep and is approachable by difficult footpaths. In this area couture line is very near so there is rough topography due to many geomorphic landscapes.

A Digital Elevation Model is an ordered array of numbers that represent spatial distribution of elevations above some arbitrary datum in the landscape (Moore et.al.1993)

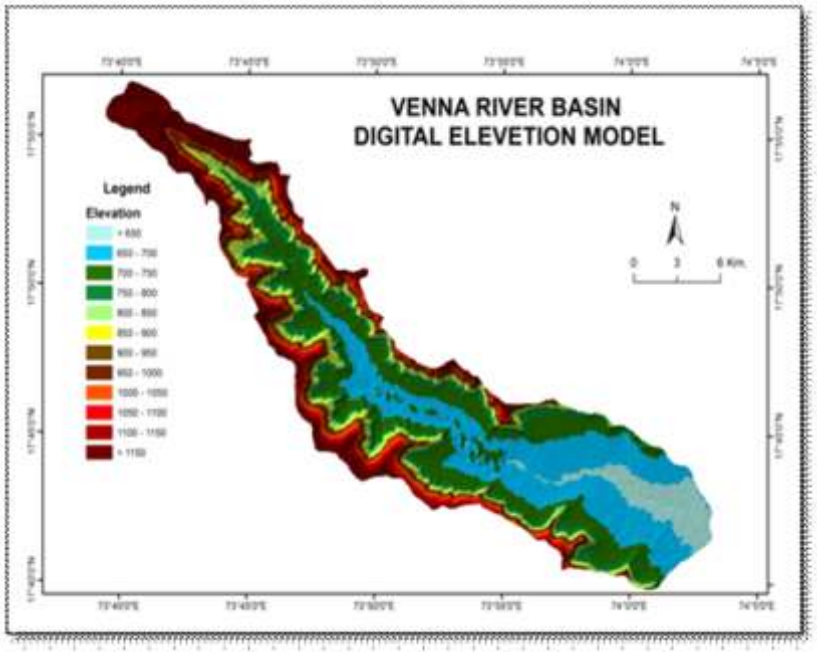

Fig.No.2 Digital Elevation Model of Venna River Basin.

Table No-1
VENNA RIVER BASIN
DISTRIBUTION OF AREA UNDER DIFFERENT RELIFE ZONE

ALTITUDINAL ZONES (Mts)	AREA		CUMULATIVE AREA		CATEGORY OF RELIEF ZONES
	Sq.Km	In (%)	Sq.Km	In (%)	
Below 650	17.279149	5.1634497	17.279149	5.1634497	LOW
650-700	83.14198	24.8449409	100.421129	30.0083906	
700-750	64.98951	19.4205206	165.410639	49.4289112	
750-800	30.839482	9.2156225	196.250121	58.6445337	MODIRATE
800-850	20.687654	6.1819978	216.937775	64.8265315	
850-900	18.661379	5.5764952	235.599154	70.4030267	
900-950	13.559533	4.0519337	249.158687	74.4549604	HIGH
950-1000	10.904606	3.2585739	260.063293	77.7135343	
1000-1050	11.900243	3.5560956	271.963536	81.2696299	
1050-1100	13.587827	4.0603887	285.551363	85.3300186	VERY HIGH
1100-1150	11.650097	3.4813456	297.20146	88.4113642	
1150-1411	37.44204	11.1886	334.6435	100	
TOTAL=	334.6435	100	334.6435	100	

Source – Based on Toposheet ((47G/2, 47G/9, 47G/13, 47G/14, 47K/2) and computed by researcher.

Venna river basin form relief zone between varying 615 to 1411 m and in four categories of relief. e.g. Low, Moderate, High and Very high. Maximum area lies in the low relief zone which includes 49.42 percent of the total study area. 20.97 percent of the total study fall under the moderate relief zone.10.86 percent area under the high relief zone.18.73 percent of the total study area falls under the region of very high relief zone.

5. ASPECT-

Aspect map for the Venna river Basin was prepared by using digital Elevation Model. In present river basin aspect classifieds into ten broad categories. In North direction slope occupies about 13.37 precent of basin, North- East, East, South-East, South, South-west, North-west and west direction slope occupies 15.28, 12.26, 13.29, 15.11, 11.84, 10.23, 11.73, percent of the basin respectively.

Table No-2
VENNA RIVER BASIN
DISTRIBUTION OF AREA UNDER DIFFERENT ASPECT GROUPS

DIRECTION	SLOPE DIRECTION	AREA IN SQ.KM	AREA IN (%)
FLAT	0.1	14.4744	4.3253
NORTH	0.22.5	44.7723	13.3791
NORTH EAST	22.5-67.5	51.1620	15.2885
EAST	67.5-112.5	38.0919	11.3828
SOUTH EAST	112.5-157.5	38.9415	11.6367
SOUTH	157.5-202.5	48.6906	14.5499
SOUTH WEST	202.5-247.5	41.6994	12.4608
WEST	247.5-292.5	26.5011	7.9192
NORTH WEST	292.5-337.5	30.3103	9.0574
TOTAL	-	334.6435	100.00

Source- Based on Toposheet ((47G/2, 47G/9, 47G/13, 47G/14, 47K/2) and computed by researcher.

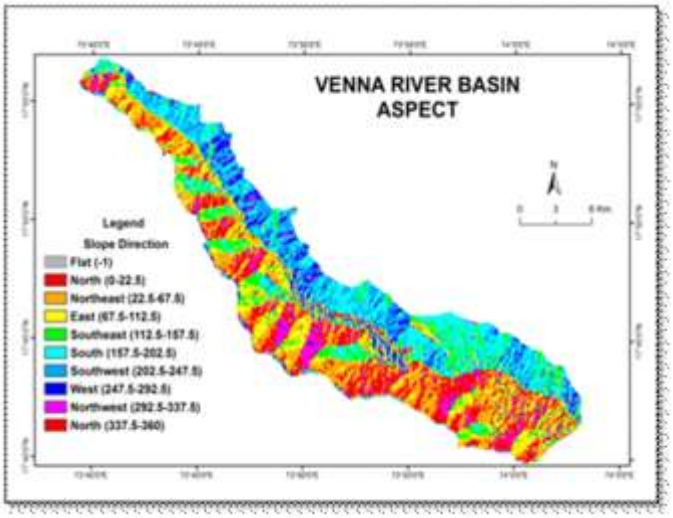

Fig No.3. Aspect of Venna River basin

6. SLOPE-

Slope map for the Venna River Basin prepared by using Digital Elevation Model. The direction of slope is Venna River extending from West to East direction. The Slope of the watershed ranges between 0 to 150.The slope categories into six classes. On the basis of Wenthworth's (1930) method is useful for the slope analysis of Venna river basin. Slope ranges 0-2 percent is represent by Nearly slope, 2 to 4 percent is represent by Very Gentle slope, 3- 5 percent is represent by Gentle slope, 8- 12 percent is represent steep slope, 12-15 percent is represent by very steep slope.

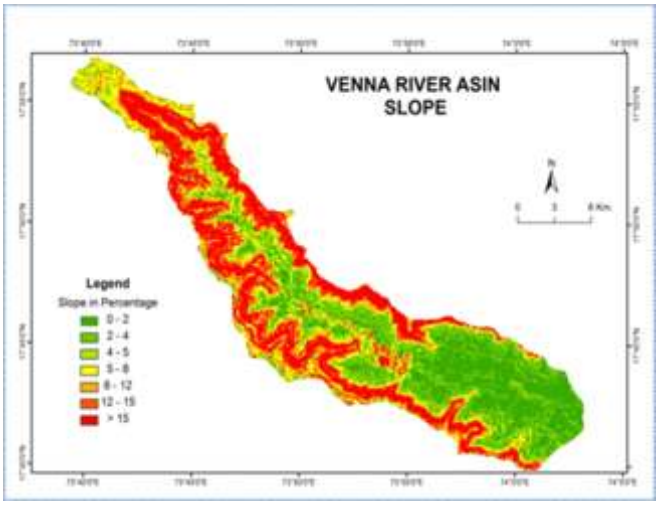

Fig.No.4.Slope Map of Venna River Basin

In the present study area the eastern part of study region and Satara city region show very gentle slope of less than 4 percent and represents less erosion of the basin.

In the present study area the Western part of Satara city has a very steep slope with hilly area and great escarpment in the upper part of the basin. The slope is more than 15percent and the area is mainly characterized by very steep slope thus representing high erosion. The slope ranges from 2to 4percent, thus this area is characterised by very gentle slope.

CONCLUSION-

Satara district lies to the west of the Deccan traps in south Maharashtra. In this basin is more rugged and with undulating topographical characteristics. In this drainage basin occupies 18.73, 10.86, 20.97, 49.42 percent area of very high relief zone, High relief , Moderate relief, Low relief zone respectively. The maximum elevation of Venna river basin is 1411Meters Mean above the sea level in western part of river basin and minimum elevation of 615 Meters in eastern part of river basin. The slope is more than 15percent and the area is mainly characterized by very steep slope thus representing high erosion in western Ghats zone. The direction of slope is Venna River extending from West to East direction.

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