

GEOMORPHOLOGICAL STUDY OF WALGAON-ACHALPUR REGION, AMRAVATI DISTRICT, MAHARASHTRA USING REMOTE SENSING & GIS TECHNIQUES

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Abstract: Geomorphology plays a very important role, determining geology of any place, regarding its structure, lithology. These Geomorphological processes include physical and a chemical change which modifies the earth surface form. Geomorphological agents are capable of transporting earth material with the help of geomorphic agents. Geomorphology varies from time to time, geomorphology we see today are not in the past, some changes will take place, and some other changes also taking place in future. This change i.e. variation in geomorphology which denotes the geology of that area is different in different seasons. It is not always constant (varies with time) to record these changes done on the earth surface. Remote sensing is a tool which captures all those processes done in the past as well as in the present and gives valuable information on changes which occur in digital format, and these will be clearly seen.

Keywords: Groundwater, Geomorphology, Purna River, Remotesensing and GIS.

Introduction

The Geomorphology of the area has been studied. Systematic geomorphologic mapping is carried out in the Survey of India Toposheet no. 55G/12. The Toposheet comprises parts of Amravati District. The present report is compiled and prepared based on geomorphologic mapping done by using remote sensing and limited ground truth. An area of 720 sq.km lying between north latitude $21^{\circ} 0'$: 21° and east longitude $77^{\circ} 30'$: $77^{\circ} 45'$ falling in Survey of India Toposheet no.55G/12 was covered. The area comprises parts of Achalpur, Bhatkhuli and Chandur Bazaar talukas of Amravati district. Mostly cover region are from Walgaon road to Achalpur talukas. Achalpur City is situated at a height of about 366 meters (1200') above sea-level. It lies more than 48.280 km. (30 miles) to the north-west of Amravati, Sapan and Bichan which flow through the town.

Accessibility of the area

The area is well connected from Amravati and Township easily approachable from Amravati. By state transport the southernmost taluka place of the toposheet Walgaon is about 11km from Amravati, on the way to Achalpur district. The Achalpur is northernmost distinct place about 44km from Walgaon and 56km from Amravati. The field checks have been made in interior parts which were also well connected by tar roads, and pedestal path or track.

Soil: Soils in the area are basically derived from basaltic lava flows and alluvial deposits. The soils in the vicinity of part of Purna River are generally deep black to dark brownish grey in colour with calcareous concretions. Land use / Land cover: vegetations and man-made features and omits bare rocks and water. In the study area agriculture is the main land use. Other than the agriculture the area comprises of wasteland, forest land, water bodies and built up.

Methods

The interpretation of satellite data for Geomorphological study is best accomplished by visual interpretation techniques with the understanding of spectral property of rock material and image characteristic of landforms. The criteria of interpretation may, however, change from region to region due to climatic influence on weathering, vegetation cover and mass movements. Interpretation of satellite images based on qualitative use of the following recognition elements.

Image element:-

1) Tone: Tone is the measure of the amount of the light reflected by an object and actually recorded on imagery, as various shades of grey. Very dark tone/Dark Grey tone: Rough surface, wet impervious soil, dense vegetation, high ground water, unbleached basic igneous rock etc. Light grey/ Medium Grey/ Very light grey: Commonly observed in smooth surface, arid regions, coral sands, sand bars, snow or ice, fresh and un-earthen outcrops. Banded tone: inter- bedded or alternating rocks of different composition show coloration. e.g. Sandstone and shale.

Tone in near- infrared (NIR) pictures, and radar images have to be viewed variably. In NIR, densely vegetated areas reflect highly and appear in lighter tone, whereas moist areas appear darker, water bodies absorbs NIR and appear very dark toned generally.

2) Texture: Texture is “frequency of tonal change within the image and is produced by all aggregate of unit features too small to be clearly discerned individually on the photographs”.

3) Pattern: It represents orderly or the typical spatial arrangement of geological, topographic and vegetation features on the photographs which may lead to their identification

4) Shape: It means the general form or configuration of various types of features. There are two types: Man-made: dams, roads, buildings etc. may easily be identified on the basis of their typical shape and layout. Natural: Eskers and Kames etc.

5) Size: Size is “a measure of surface or volume dimension of an object.” The size of an object can be well identified by relating it to the size of known objects on images or by studying the shadow cast by the object.

6) Shadow: Shadow gives an effective side of view of some of the features. Even slight topographic break is accentuated by shadow. Geotechnical or terrain elements:-

After the examination of satellite images for image elements, they are analyzed from geotechnical point of view.

Landforms: Analysis of landforms and physiography permits the identification of rock type, soil etc.

Vegetation cover: This may be due to topography, soil, rock or moisture factors or various combinations of these. Contrast in vegetation may be observed between areas underlain by bedrock and those underlain by unconsolidated material. The magnitude and orientation aspect of slopes also influences vegetation. One commonly observed case is the contrast in vegetation on the north and south poles of East-West trending ridge or spur. The north facing slope receiving less direct sunlight tends to retain more moisture over a longer period of time and can therefore support vegetation to a greater degree than the warmer drier south facing slope.

Drainage Pattern and Density: The change in soil or rock type is generally accompanied by a change in drainage pattern. Since erosion, transportation and deposition by running water occurs in most areas.

Land Use: It gives information about the soil condition. Rugged topography and associated sandy soils development on sandstone are generally left as forests. Comparatively level or valley topography and associated clayey soils developed on shale and limestone are generally cultivated. Presence of semicircular pattern of land use with depression in the centre indicates an area of poor internal drainage with plastic nature of clay.

Remote Sensing and GIS

‘measuring at a distance without physical contact’. Eyesight is a form of remote sensing. When taking photograph of an object, the electromagnetic radiation is recorded on the film. The sensors are the instruments used to observe the Earth, which will be the cameras, scanners, radars etc. The platforms will be the planes and satellites. A camera can however record in a broader range of radiation. The color will be either ‘black & white’ or ‘colored’ depending on the film used for recording the image. When using a sensor on a satellite, the

sensor will record data and what is invisible to the human eye can be identified on a satellite image.

Electromagnetic spectrum covers the entire range of wavelength and frequencies which travel in waves of various lengths.

Sensors: A sensor is a device used to acquire a photograph or an image. a sensor 'sense' and measure the amount of radiated energy reflected from an object and record it. Images are black and white. The reflected part of the incident energy on a surface feature will decide the color of the feature. So in remote sensing we use a unique instrument with three sensors to take three images, in three different bands (i.e. three different wavelengths ranges). These are then combined or put together to create a colorful image.

Discussion and Conclusion

Toposheets no.55G/12 i.e. Walgaon-Achalpur region comprising the area of 720sq.km is thoroughly studied in the Geomorphological point of view. The soils of this area have been developed on the hilly and undulating topography. The soils, therefore, show a wide variation in their depth. A major part of the study area is covered by the alluvial plain. Various geomorphic units were identified from the satellite imagery and classified as plain, slope, valleys, and River. Other units such as built up and water bodies were also identified. Plains are extensive area of flat or level land. In this majority of the area falls under the plains. Out of the 720 sq.km area of the study area, 518.80Sq.km area belongs to the plain area. Valleys may be as a low land surrounded on sides by the slopes. Every major River is associated with its valley. In the area all the major Rivers such as Purna, Bordi, Pilli, Bichan, Sapan, Renuka, Chandrabhaga, Pedhi, and Bor have their own Valleys. Area shows Dendritic Drainage Pattern. And is mainly drained by Purna and its tributaries. The River Sapan, Bichan, Bordi flows from the Western side of the Purna River. River Pedhi, Bor, Renuka flows from South-eastern part of study area. Some small streams such as Ambada nala, Vaghadi nala, Wardha nala also drain the area.

Small surface bodies flowing in channels of their own are streams. such as, Ambada nala, Vaghadi nala, Wardha nala, are found to be flowing through the study area. There are 26 major built up and 4 water bodies or water tanks are identified in the area. Also 1 undulating plain is identified. The Landforms represent low lying isolated hill. Any structure of rock masses raised to conspicuous elevation relative to its surrounding area is termed as a hill.

Geomorphology Map

The area occupied by the each feature mapped in the study area is summarized in the following table: Survey of India Toposheet **1:50,000 Scale** & satellite imagery have been used to prepare geomorphology map.

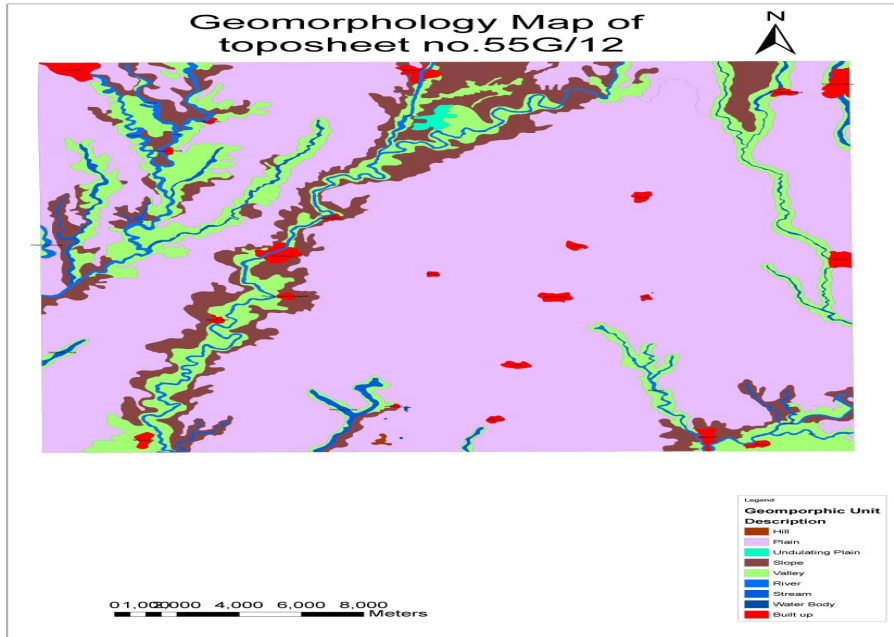


Table 1. Statistics of the Geomorphologic Mapping

<u>Sr no.</u>	<u>Geomorphic unit</u>	<u>Area in Sq.km</u>
1.	Built up	10.87
2.	Hill	0.24
3.	Plain	518.80
4.	River	15.26
5.	Slope	73.98
6.	Stream	9.98
7.	Undulating plain	1.29
8.	Valley	88.64
9.	Water Body	0.07
	Total Area	719.12

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