
Geomorphological Mapping Using Remote Sensing and GIS A Tool for Land Use Planning in and around Visakhapatnam, A.P, India

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Abstract

Landforms on the earth surface are costly to guide or screen. Remote Sensing perceptions from space stages give a concise perspective of territory on pictures. Satellite multispectral information have preference in that the picture information in different groups can be subjected to advanced improvement methods for featuring contrasts in objects for enhancing picture interpretability. Landforms are deciphered based on translation component keys to be specific, for example, tone, surface, measure, shape, shading and so forth and concentrate the particular data from the false shading composites LISS-III sensor pictures. Geomorphological units are ordered on the premise differential disintegration forms. The information completed in the time of 2011, In the investigation zone, basically Piedmont incline, Wave cut seat, Fluvial sand stores, Marine sand ridges, Valley fill shallow, Denudational slope, Structural slope, Pedi plain shallow, Pedi plain direct, Pedi plain direct are mapped utilizing IRS-ID LISS-III satellite symbolism utilizing visual elucidation system alongside field check. Remote Sensing and GIS offers to distinguish, dissecting and time financially savvy approach to satisfy these objectives.

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1. Introduction

These days, Land utilize arranging is an imperative undertaking for neighborhood and government specialist to give appropriate land to human exercises in the examination region so it is understood that land utilize arranging should be produced in a coordinated and complete way in view of geomorphic think about. In this examination, Remote Sensing and GIS, apparatuses and techniques are used to recognize landform, geomorphic units, and area mapping since geomorphology is the base of land use organizing.

2. Location of Study Area

The area of investigation is located in between 170 731 and 170 801 North latitude and 830 321 and 830 451 Eastern longitudes. Geographically, the area is covering 236 km², out of which approximately half of the area covers under the jurisdiction of GVMC and rest comes under the Bheemili municipality. The study area is a part of Visakhapatnam and Bheemili municipalities of Visakhapatnam district of Andhra Pradesh.

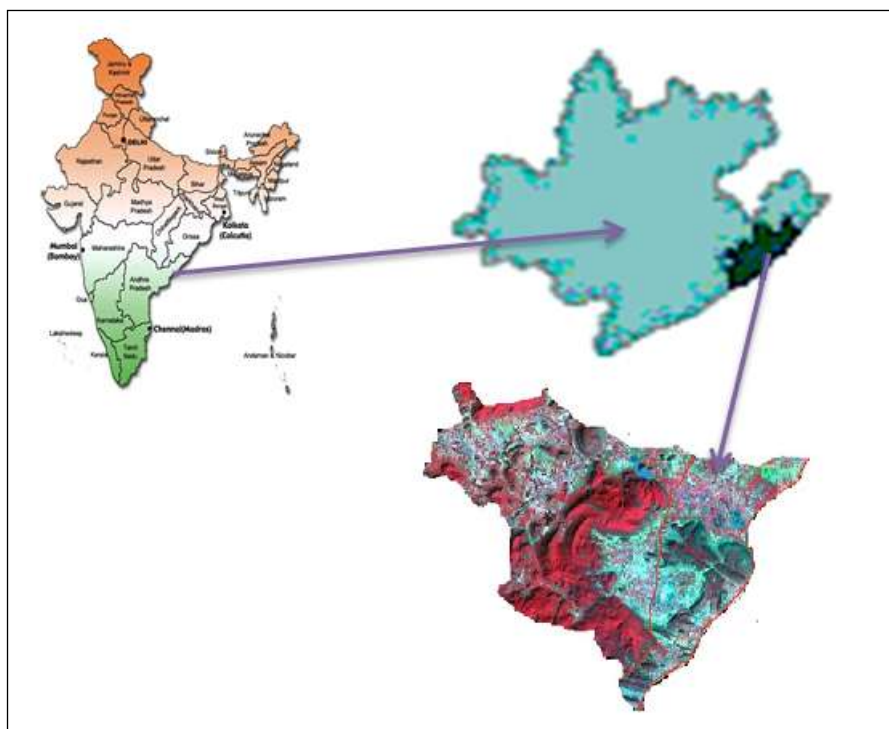


Figure1.1: Location Map of the Study Area

Data Used and Methodology:

In addition to Remote Sensing data, different collateral data have been used in the present study.

Remote Sensing Data - IRS – ID.

- Sensors – LISS – III (23.5m resolution) - dated April, 2011.
- Digital data – Scale 1:50,000.

- Toposheet of 65 O/5, O/2 of 1: 50,000 scales have been used to delineate base map, drainage etc.
- SRTM data of 90 meters resolution.

Results and Discussion:

Thematic maps:

Geomorphologies have been generated on satellite data. Standard visual interpretation techniques as per the norms given by NRSA have been followed and delineated on screen digitations of features.

Geomorphology:

The fluvial and erosional landforms of the area have been delineated on satellite image following the procedure suggested by RGNDWM of NRSC, (2011). In these terrain elements nearly ten geomorphic erosional and fluvial classes have been delineated. The major features of the area are pediplain shallow, pediplain moderate, etc. The run-off features of hills are exposed prominently in the northeast part of the area. More inselbergs, pediment inselberg complexes have been delineated in an irregular manner. The area of each class and its percentage is given in Table 1 The geomorphology map of the area is shown in Fig. 2.

Table 1. Area and percentage of each class

Geomorphology	Area in Sq Km	% Age of Area
Denudational hill	14.246	6.04%
Fluvial sand deposits	2.891	1.23%
Inselberg	4.750	2.01%
Marine sand dunes	0.550	0.23%
Pedimontinselbergcomplx	0.461	0.20%
Pedimont slope	64.630	27.39%
Pediplain deep	9.349	3.96%

Pediplain moderate	5.938	2.52%
Pediplain shallow	42.604	18.06%
Reciduous hill	25.317	10.73%
Structural hill	60.196	25.51%
Valley field	4.835	2.05%
Wave cut bench	0.1996	0.08%
Total Study Area in Sq Km	235.967	100.00%

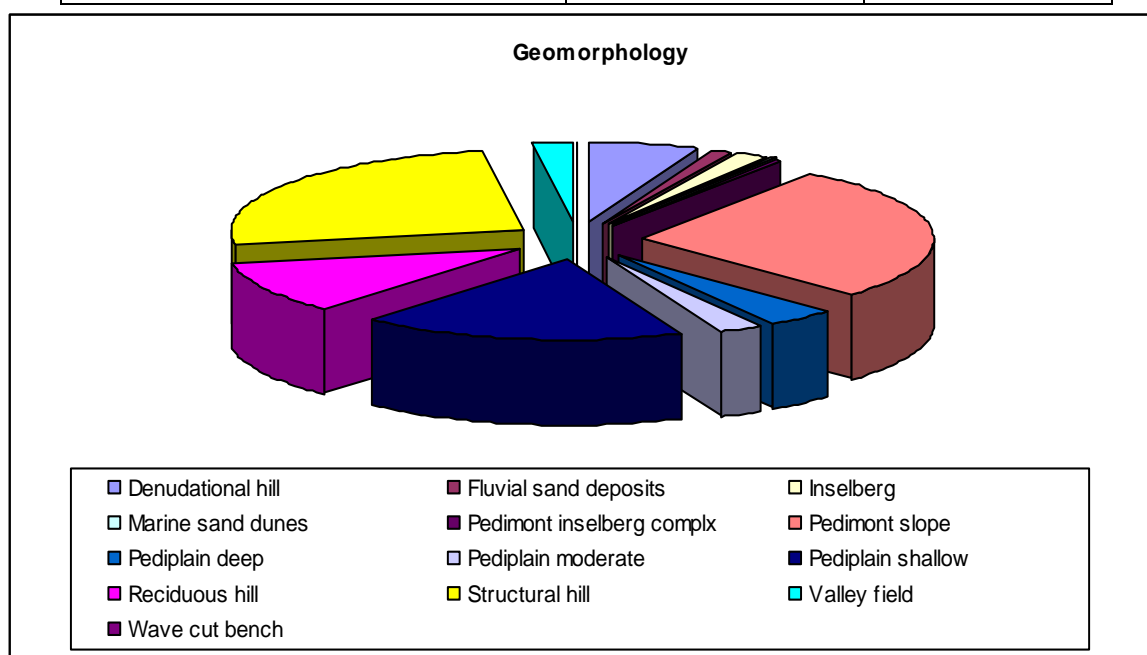


Figure 2.2: Percent area of each geomorphic class.

The Denudation hill, Inselberg, have been excavated at hill flanks for laying road to Bheemili. Denudation hill at TennetiPark the hill flanks was separated into two hill rock masses. The study road expanded to 100 meters through this limb of which hill, separated the hill masses into, rock blocks. These are left on the cut portion of the hill slope loosely which are liable to collapse. These rock wedges, fractured rocks are highly dangerous and liable to collapse on to the road. The rock is highly fractured/ jointed irregularly. While removing for road construction these fractured rock boulders have lateral/bottom support and therefore not removed. Over a period of time, the fractured rock boulders loose the bottom and lateral support which are liable to collapse at any time. If the rainfall exceeds up to a certain limit, these rock boulders slide on to passenger vehicle

passengers who may not aware about such sudden failures.

Similarly the hillock contained highly weathered pockets along the road alignments. Since this weathered material has good binding property and clay content, it occurs on sloppy land in the hill flanks. Torrential rains saturate these material and liable to slide as soil slump/creep. This may cause slippery sliding of the vehicles passes through this road.

Pediplain shallow areas are in the vicinity of river mouths and rivulets of terminates as a separate river in to the sea. There are five culvers and bridges have been constructed enrout of the road. Some of these culverts are at mean sea level and often experience with high tide sea water. A considerable amount of sea erosion and deposition taken place at these drainage bodies. There is a possibility of road breach at these places particularly with the intensity of sea waves / currents.

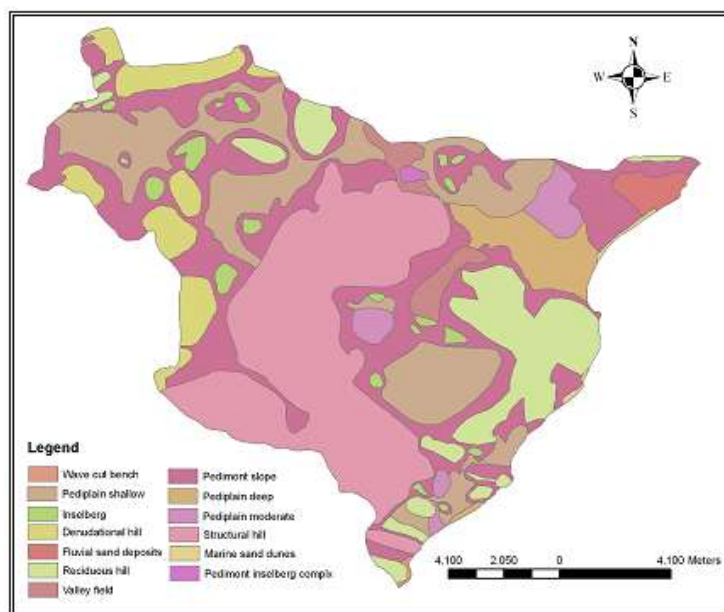


Figure 3: Geomorphology of the study area.

Table 2: Run-off and infiltration zones.

	Geomorphic classes	Area (km2)
Run-off zones	Denudational hills, Inselbergs, Pediment Inselberg Complex(PIC), Residual hills, Structural hill	105.001
Infiltration zones	Valley fill shallow(VFS), Pediplain shallow, Pediplane Moderate(PPM), Pediplain Deep(PPD), Piedmont slope, Wave cut bench, stabl marine sand dunes, Fluvial sand deposits	130.959

The study road crosses over stabilized marine sand dunes and fluvial sand deposits. The stabilized sand deposits are deposits are exposit near INS Kalinga, thotla konda, etc. Similarly, fluvial sand deposits are exposed at erramattidibbalu, etc.

GIS Layer Generation and Analysis:

A GIS is a computerized device for proficient capacity, examination, and an introduction to geologically reference data implies encouraging the creation and utilization of data. It goes for capacity and recovery of a wide range of information at a specific area in space and recognizing information needs obtaining of information, administration, preparing and decision making [8]. In the present investigation, different topical geomorphic units, in particular, are Piedmont slant, Wave cut seat, Fluvial sand stores, Marine sand ridges, Valley fills shallow, Denudational slope, Structural slope, Pedi plain shallow, Pedi plain direct, Pedi plain direct have been created.

Conclusion:

The approach and results talked about in this paper. Land utilize arranging is nonstop process because of characteristic and human causes. For future land utilize arranging, it is important to comprehend the current geomorphic units and degrees. Remote Sensing and GIS have the capacity to mapping geomorphic units. It gives the vast perspective of earth surface highlights on the satellite and has different instruments, the procedure to investigate the geographic highlights. Geomorphology of the area has been delineated on IRS-ID-LISS-III satellite data. In GIS analysis, nine classes of Piedmont slope, Wave cut bench, Fluvial sand deposits, Marine sand dunes, Valley fill shallow, Denudational hill, Structural hill, Pedi plain shallow, Pedi plain moderate, Pedi plain moderate have been considered to locate landslide vulnerable zones along the Bhimili road. Now, based on mapped geomorphic units local and government authority can make decisions to land use planning for human activities.

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