

Spatial Analysis for Landslide Study of Anuskura Ghat Section

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Abstract— Landslides Are One Of The Natural Phenomenons. It Can Happen Anytime. The Landslide Study Can Be Done Different Ways The Latest The Landslide Study Is Done With The Help Of High Resolution Images And The DEM Data. With Help Of This Data's The Landslide Maps Are Prepared By The Help Of Spatial Analysis Tool. The Prepared Maps Are Used For The Landslide Study

Keywords— Ghat Section; Landslide; Slope; Thematic Layers

I. INTRODUCTION

Landslides are the one of the natural hazards that causes every year where we have a great loss. For the development of the country it is necessary to build roads and railways etc. for the construction of the railways and roads it is needed to cut earth due to which the stable land will become unstable. As the development of the country increases the losses caused by landslides are also increased. Landslide is a process that results in the downward and outward movement of slope-forming materials including rock, soil, artificial fill, or a combination of these. The materials may move by falling, toppling, sliding, spreading, or flowing. It is due to the natural erosion process that shapes the landscape and cause high damage to people and their properties. For the planning of the future development the essential thing is the identification of the most prone areas related to landslide

Geographic Information System (GIS) is computer based software to study related to the earth surface. GIS can show different data on one map. So by this it can be easily analyze and study about the landslide. In GIS we can integrate different data together so that we can compare and can do a deep study regarding that area.

The geography was extremely tough and unforgiving with steep cliffs, deep gorges, uneven grassy and rocky plateaus, swampy marshes, thick jungle, broad rivers, wet hills and so on, especially in Maharashtra where the Western Ghats reach directly to the sea. The geography changed every few kilometers and the builders had to cut through hard volcanic

rock, soft and wet clay, tropical jungle and loose sand. During the monsoon period, landslides are a common in the Western Ghats, and its intensity depends upon the thickness of the loose unconsolidated soil formed by the process of weathering. Debris landslides with a combination of sap rock, saprolite (rotten rock) and soil, indicate the role of weathering in landslide occurrences. Every year during monsoons some issue or other happens on the ghat resulting in stopping the journey through the ghat.

Anuskura Ghat:

Anuskura ghat is located in the route from Shahuwadi of Kolhapur district to Rajapur taluka of Ratnagiri. It is a newly formed route. Its coordinates are from 16.4536N 73.4738E. The main ghat section is of 4 kms nearly about 1000ms elevation difference. The landslide is a common phenomenon in the western ghat sections. In most of the rainy season the landslide is happening in this route in different ways. Here it is going to study about the landslide prone areas in the Anuskura ghat route so that we can come to know which are the areas more vulnerable to landslide and can take needed precautions. As the landslide prone areas are identified by the help of GIS and other maps. The areas are verified by going to the onsite and by the help of tests. Once the area is verified which are vulnerable to the landslide, Remedial measures and precautions can be taken to avoid the landslide happening in the future life. By taking needed measures we can have a smooth and easy journey through this route.

II. METHODOLOGY

The main part of this study is to prepare the thematic layers with the help of DEM and Google images. These thematic layers are prepared by geo-referencing, geo-coding. Various thematic layers which are developed are slope and aspect map, drainage map, NDVI (normalized difference vegetation index) map. These maps are prepared with the help of GIS Software by spatial analysis of DEM and Google earth image

FLOW CHART

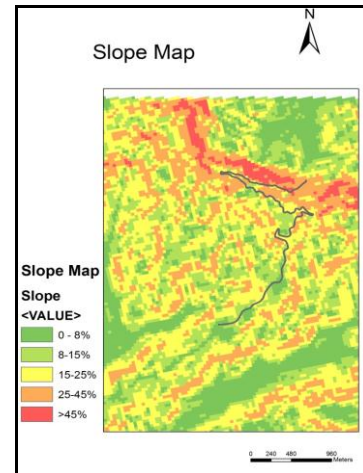
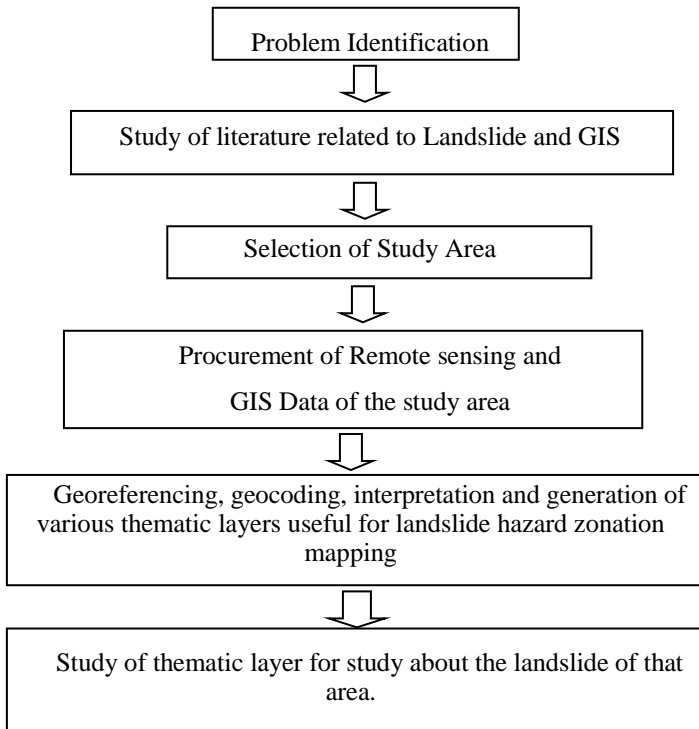


Fig 1 slope degree map

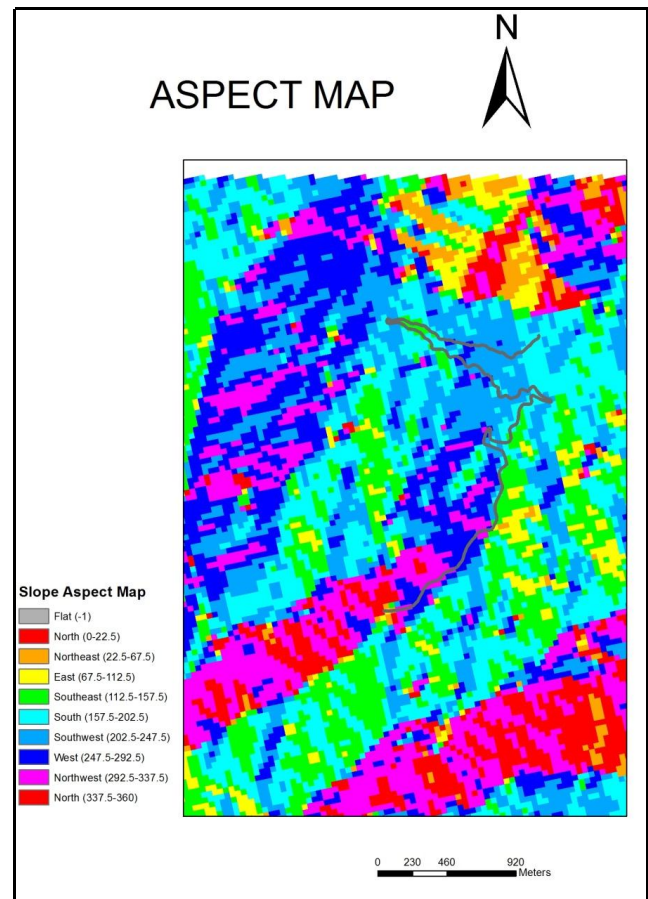


Fig 2 Slope aspect map

Data collection

For the preparation of thematic layers The Cartosat-1 Digital Elevation Model (Carto-DEM) is used for this study. Cartosat-1 DEM is a National DEM developed by the Indian Space Research Organization (ISRO). It is derived from the Cartosat-1 stereo payload launched in May 2005. Google earth image is used for this study of the area

Slope and Aspect Map:

Slope and Aspect map is prepared from digital elevation model. Fig 2 shows the ground slope direction with respect to North. Sometimes slope aspect may have the importance in landslide study. It has been observed that in this particular area, the slope aspect has a little control over the landslide. Fig 1 slope map shows the degree of ground slope. Sometimes the slope of the area plays an important role in the reason for the landslide.

Drainage Map:

The drainage map is prepared by the help of DEM. From the DEM the fill layer is prepared. From the fill layer the flow direction layer is prepared. The final drainage map is prepared from the flow direction layer.

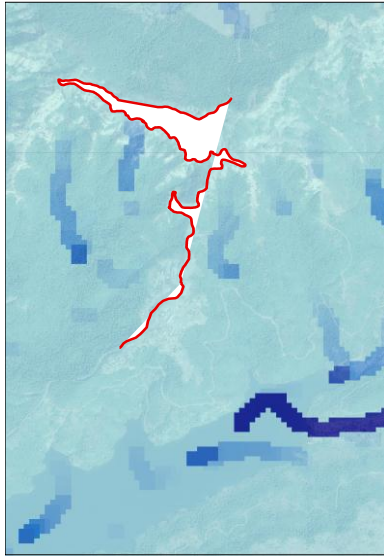


Fig 3 Drainage map

NDVI (Normalized Difference Vegetation Index) Map:
Normalized Difference Vegetation Index Map is prepared from the high resolution satellite imagery procured from the Google Earth.

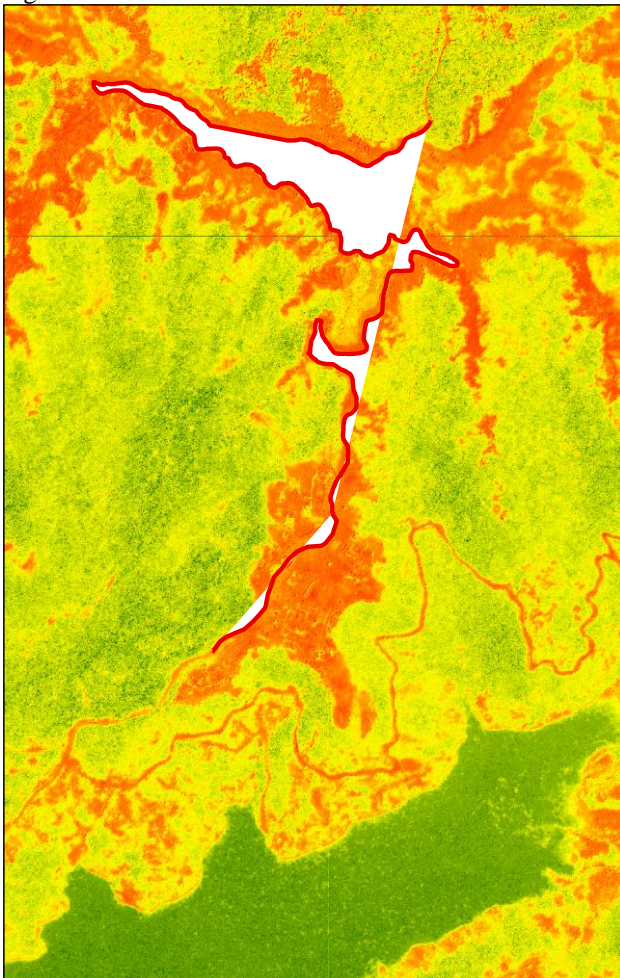


Fig 4 vegetation map

III. RESULT & CONCLUSION

From these maps we came to understand the landslide prone areas of Anuskura ghat section. From the slope and aspect map it is clear that the degree of slope of that area is more than 30degree that indicates that the area is having high chance for landslide. The vegetation index map shows the vegetation of the area from the map it sjows that the ghat section is having less vegetation it may lead to landslide during the rainy season. From the drainage map it is learned that the drainage fo that section from that it is clear that the area is having high slope and less vegetation and streams are flowing so due to flow of streams in the rainy season chance for landslide is more. This can help to take needed landslide precaution measures of that Anuskura ghat section

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