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Effectiveness of Mapping of Geomatics in Landslides Area: An Approach of Remote Sensing & GIS

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Abstract – Landslides are very often in mountain areas like Himalya region. Landslide causes loss to man, his properties and ongoing development projects. Landslides are majorly found after heavy rains when a lot of water penetrates into the soil resulting in inner pressure and landslide takes place. Deforestation is considered as the big reason for the landslide as in empty soil, most of the rain water penetrates into the soil and pressure forces for landslide. However, some geologists considered the type of rock, nature of rock and other parameters like angle, tetonic deformation etc. for the phenomenon of landslide and the inner structure of rock is analyzed. The current article highlights the mapping of geomatics based optimum landslide using remote sensing & GIS approach.

Keywords: Remote, Sensing, GIS, Landslide

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INTRODUCTION

In Indian sub-continent, the major landslides are observed in Western Ghat of Maharashtra and Himalyas. The reason of landsliding in Western Ghat of Maharashtra is observed due to heavy rains whereas landsliding in Himalyan region is observed due to active tectonic movements.

GIS and remote sensing techniques are very helpful in mapping of landslide vulnerability zone. To get the information regarding landslide, firstly the black and white photographs are used to locate the landslide and after that the mapping is done with the modern instruments like remote sensor and GIS.

Various image processing techniques are available to carry out this process. Some of these imaging techniques are Linear Stretching, Pseudo Color Composite and Density Slicing etc. After the task of image processing, a manual survey of the spotted region of landslide is performed. During the field survey, landslides and land slips are located.

For the purpose of mapping, Landslide Susceptibility Zonation (LSZ) methodology is used. This method is used to organize several parameters such as meteorological, geomorphic and geological factors. A slope failure is observed a collapsing in slope is found due to gravitational stress causing landslide.

Mapping of these vulnerabilities is performed so as to predict the future landslides and more precautions can be taken to avoid these things in the future. In most of Uttrakhand's peaks where the water level in rivers is increased during Monsoon and this high water level causes the movement in mountains leading to landsliding.

The following figure shows the landslides occurred in mountain region of Himachal Pradesh.

Figure 1: Landslides in Mountain area of Himachal

MAPPING OF GEOMATICS BASED OPTIMUM LANDSLIDE

LSZ mapping is constructed with the Weights of Evidence technique, a statistical process for calculating risk assessment utilizing training information, like an established listing of previous landslides. This statistical method provides info retrieved from the geographic info system (GIS) as well as remotely sensed information being incorporated regionally.

The statistical approach provides confidence and consistency of regional LSZ maps since they could be interpreted using a typical baseline.

The scientists hope that much more accurate mapping helps communities prepare for disasters like the one which came about in Uttarakhand in 2013. In a typical season, the monsoon rains soak Uttarakhand throughout the 2nd week of July; however, in 2013, those rains come in June, a month earlier than expected, catching Uttarakhand off guard. During the spring months, water levels are high with snowmelt from glacial lakes and also waterways. Combining monsoon rains with snowmelt throughout the spring is able to result in damaging floods & landslides. As an outcome, 7,000 folks as well as thousands of pets lost the life of theirs in a rainfall event on June 15th which took place within the Mandakini Valley, east of Nanda Devi National Park. Contributing to the devastating losses, the Manadkini Valley is home on the Kedarnath Temple, in which Hindu pilgrims traveling between the months of May to October. The high volumes of individuals paired with the early activated monsoon resulted in improved losses.

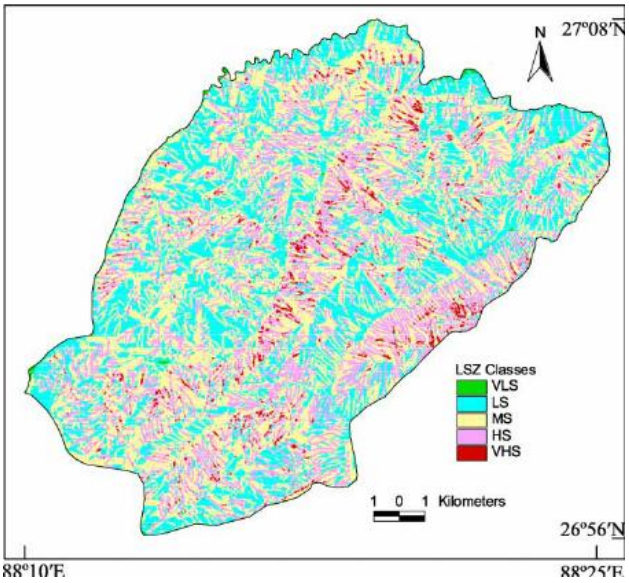

Figure.2 The figure shows cliffs and landslides in the region developed in proximity of drainage lines

The LHZ maps are created and revealed in environmentally friendly to colors that are red depicting visit end signals from safest to vulnerable slopes. These're though tentative though they're first and informative very order maps for planning stage. These may be utilized for land use planning and street alignments. However before entering into any land use, a person needs to examine them within the area and figure out in the region of review regarding where such slopes are very vulnerable for landslides.

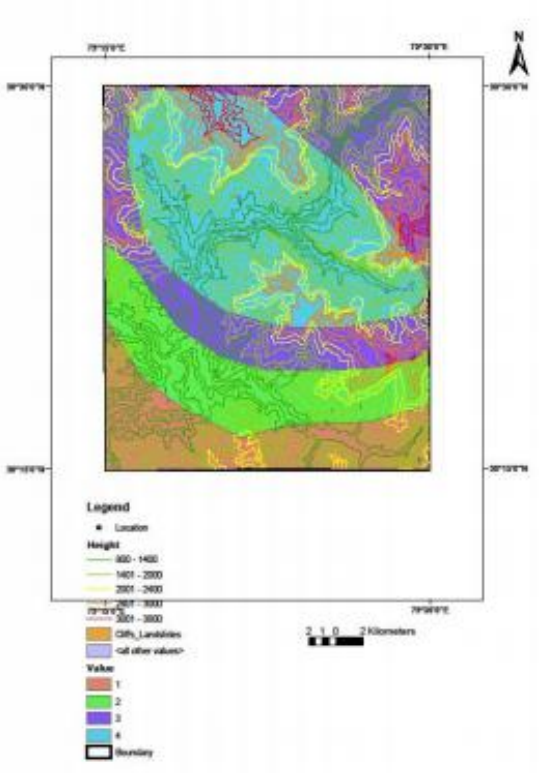

Figure 3: Seismic zones of Chamoli

DISCUSSION

The benefits of a slope facet map are numerous. First they're not hard to create and almost no Software is needed and no trained manpower is required in this situation. However in case we insist for a software program to accomplish this than the Envi Image software program for textures is the practical ones. This facet chart is produced from contour data manually. However some argue that a DEM might be utilized to produce such a slope map which may be tried also. Though the results aren't the same.

The connection between drainage lines and also landslides or perhaps rather distance to landslides is a considerable observation. This's mainly because that drainages particularly the initial order drainages are usually created along fracture planes that become pathways because of the rain water to go by.

It's been discovered that there's a considerable coincidence between the slides plus drainage lines

that is certainly mirrored in the buffer zone analyses of drainage lines. The buffer zone of 200 meters is a great distance for accounting the majority of the cliffs and slides that indicates vertical cutting and a downgrading of rivers as a result of increase of Himalayas is a major component. This's a component of erosion process in Himalayas. A buffer zone may conveniently be produced using Arc Info and connection of cliffs plus slides found.

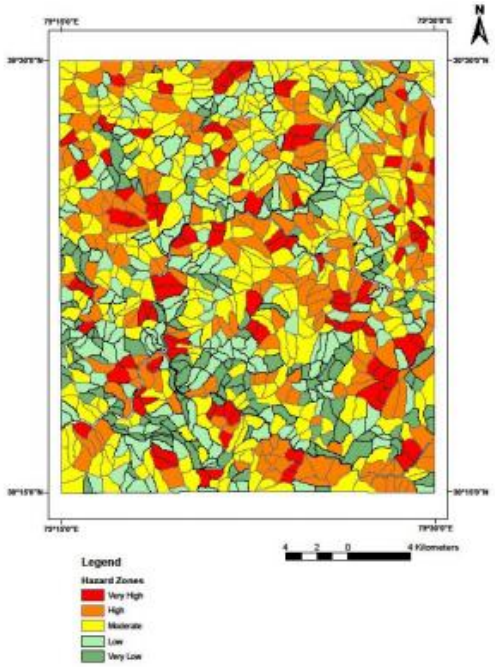

Figure 4: The Landslide Hazard Zonation map of the area based upon slope mapping and scores

LSV maps may additionally be produced from a knowledge driven approach which entails much more human interpretation; however, this particular strategy relies on expert evaluations of an area. Based on the post, the statistical strategy is employed more often since it lacks the subjective nature of the knowledge driven method. When an area is examined by an expert, interpretation and risks of potential risks will differ according to the professional, making the danger of human error.

CONCLUSION

The zones are suggestive and also clearly show the means of evaluation of landslide possibility. There's a chance that really tall hazard zones would be the ones that need previous treatment and interest which these slopes are much more vulnerable to slides provided the slope, other aspects and rock type as established.

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