A Study on Land Slides in India

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Abstract:

This paper focuses on the landslide activity occur frequently in India. Landslides are considered as most important kinds of natural hazards during monsoon in the Himalayan mountainous region of India, the study states that the landslides occurred as result of natural and human related activities and that give effect on human and animal life, but only these reasons are not causes of landslide occurrence at that place which are very low suspected to landslide or not lie in landslide zones and another, in this paper we have discussed the study on land slides in India. We need to investigate the soil and to find out the changes in soil which leads landslide and extreme rainfall events. This paper provides an idea which may interrelate effectively with hazard control, because of the greater mechanical strength of lithosphere of earth compare the asthenosphere, Tectonic plates are able to move.

Keywords: *Himalaya, Landslides, rainfall, Tectonic Plates*

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Introduction

In India, various types of landslides occur in especially in Himalayas, particularly in monsoon season that includes block falling, debris slide, debris flow, rock fall, rotating slip and crash. Landslide is defined as the gravitational activity of a bulk of rock, or bulk of earth or remains, downhill arranged a hill. It usually happens because of the unstable hilly slope occur by the natural causes such as ground water destabilize the slope, , quakes, volcanic outbreaks, soil erosion, etc. Landslides are triggered by heavy rainfall which give outcomes in the form of simple destruction to lives and property as well as the destruction of communication systems and movement of road traffic. In India, Landslides are main hazard which occur in most hilly and mountains areas, and also in vertical river banks and coasts. In India, the reasons of landslides are not vary from the world, but has some individualities. The main factors of landslides are: removing of lateral and underlying support result in the instability of Slope, uncritical cutting down of trees, Slash and burn agriculture activities in hills, construction of road and excavating activities, as we know the population is increasing day by day due to which there is need of grazing activities, suburbanization result as the reduction in the dense and evergreen forestry cover, through these actions of human, the environmental stability is disturbed, thus resulting in releasing of the soil under the circumstances of weighty rain.
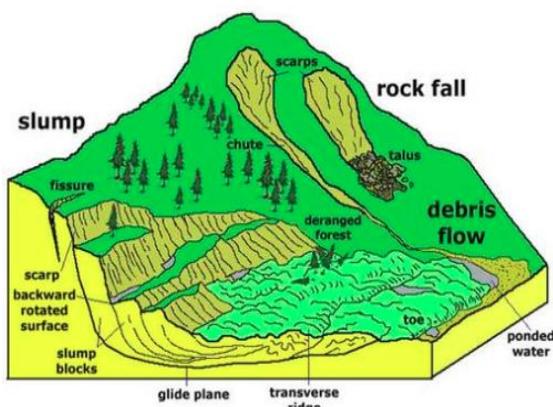

Figure No. 1 Hilly Areas like above are More Prone to Landslides

Causes of Landslides

Landslide Triggers - Cloud burst (200-1000mm/day), Unrestrained movement of water on sloppy surface from over flooded sheer valleys, as well as cutting of toe may also helpful in activating failure by overtopping of slides and rock block in any related in Earthquake, colluvium, Blasting 11, Flash flood due to freezing river eruptions

A) Man Made Causes- Deforestation, Blasting quarrying, Hill cutting, Irrigation of paddy fields, water storage ponds, Undermining, tunneling, and Vehicle vibration in hill roads

B) Process of Erosion – there are many ways of erosion like natural drainage blocking, Great movement speeds in vertical valleys, Pore water pressure Geological conditions- Mineral composition, rock type, structure etc (Shrestha B.D, 2000)
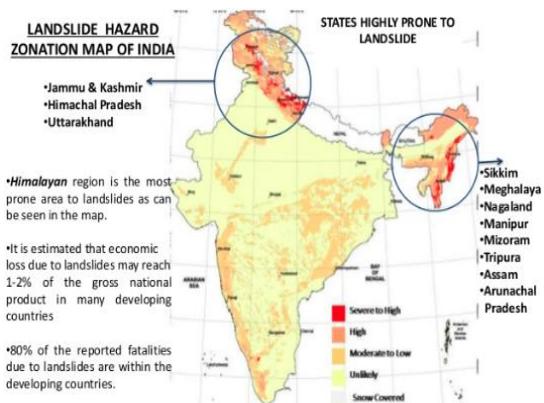

Figure No. 2 States Highly Prone to Landslides

Under the General Landslide Studies, these interested areas have equal opportunity in law, organizations as well as groups. In this studies, reader finds a pool of interest but dissimilar suggestions on a wide series of key matters (Bobrowsky Yin and Strom 2015).
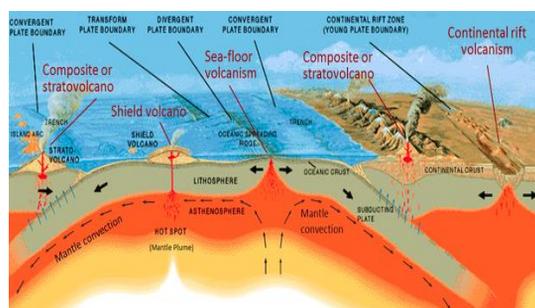

Figure No. 3 Tectonics Plates Beneath the Earth Surface

Review of Literature

Ray and Pandey (2016), discussed in their paper about evidences significance of the use of a GIS database created from existing digital map, satellite data, AHP, MCE technique and field investigations for the assessment of landslide hazard zones in disaster prone Himalayan mountainous region, this study reveals that a large part of the study area (i.e. 20.15%) is unsafe and is not suitable for construction works, 16.93% area is vulnerable to instability and only 48.16 % area is safe.

Bobrowsky et al. (2015) studied 3rd World Landslide Forum's common landslide" session in which numbers of topics are presented ranging from early threatening systems and modelling to Geomorphology, Dense waste removal settlements to flow process and landslide, Vulnerability mapping etc. the discussed topics correlates with the problems, observations and resolutions to hill instability.

Sarvade et al (2017), studied that analyzing geotechnical aspects of the catastrophe. Some of the key facts to note are, heavy rainfall before the landslide (10.8 cm on July 29) and heavy downpour throughout the following day. This calamite is a lesson for sustainable geotechnical planning in future to avoid massive loss of human life and property. Detailed analysis of geotechnical facts is carried out and an attempt is made to pinpoint the cause and preventive measures are suggested.

Kundu et al. (2011) discussed about an effort which were made for the generation of LSZ map of the study area. Bivariate statistical modified Information Value (InfoVal) technique was used in Himalayas' small watershed for the development of LSZ map. The numerous causal issues are responsible for landslide for example: aspect, lithology, slope, relative relief, structure (confirmed thrusts, faults), land use lineaments, and land cover, drainage density, distance to drainage, and anthropogenic features such as distance to road area which is related with landslide action. Remote sensing and GIS techniques are used to locate these factors. The accurateness of the LSZ map was estimated through the ratio of frequency and success rate techniques.

Sarkar et al. (1995), stated that there is need of identification and classification of hazard areas as per the degree of real or possible hazard for the assessment. This paper talks about the techniques for the searching and characterizing the landslide hazard zone which were analyzed in the Srinagar-Rudraprayag zone of the Garhwal Himalaya. The factors like lithology, slope angle, drainage etc. initiate the landslide. From this study, landslide are categories into five regions of instability and the results have been confirmed in the field.

Tohari (2018) studied that rainfall-induced landslides are very risky for the people and infrastructure. There have been many studies in which most of them were conducted on the basis of numerical analysis and laboratory experimentation. In this paper, hydrological situation of soil slopes were discussed as a major cause of the beginning of rainfall-induced landslide. Later it also covers the response of hydrological profile in the slope. In the end of the paper, various research topics are suggested for future study. Prior studies realted to the hydrological response of soil slopes give the better understanding about hydrological situation that leads to the landslide beginning. On the other side, various studies were conducted on the dimension of pore-water pressure reaction. In some other studies, soil moisture content are able to improve the understanding related to the hydrological reaction of a soil slope regarding the rainfall infiltration.

Keefer (2002), studied on post-earthquake field surveys of landslide that provides the basic understanding, assessing, and charting the hazard and risk that are related with earthquake-induced landslides. Before 1783, historical data about the effect of landslides due to earthquakes are partial and unclear which has a limit of use. In the mid-twentieth century, many landsides occurred due to earthquake were captured through Arial photography in United States, Peru, Guatemala, Italy, El Salvador, Japan, and Taiwan. In 1984, the worldwide and national data were created on earthquake-induced landslides which shows various characteristics and relations among their happening and various geologic and seismic factors. Though, the studies about the landslide due to earthquake is limited and there is need of research in this area with complete documentation about landslides due to earthquake in the environment.

Conclusion

In the present paper, we have discussed reviews on various landslides in india that occur every year causing big loss of human life and infrastruture in hilly zones. This paper is helpful to turn the focus

towards future devlopment planning and coinfiremend that the most of the landslides are located in the very high and high instability zones due to tectonic plates, natural hazardas, heavy rainfall and temprature on landslides. It is not necessary if we control the volme of landslide then the landslide begning will be reduced. The resaon behind the landslide initiation is different. Many serious examination were conducted for controlling the landslide and soil erosion. In these experiment, soil testing and vegetation were analyzed that provide an idea for the choice of plant material which fit with the soil and environemntal conditions of landslide zone.

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