Xournals

Academic Journal of Earth Science and Geological Studies

ISSN UA | Volume 01 | Issue 01 | June-2018

A Study on Land Slides in India

Rais Khan [1]

Available online at: www.xournals.com

Received 12th January 2018 | Revised 15th April 2018 | Accepted 15th May 2018

Abstract:

This paper focuses on the landslide activity occur frequently in India. Landslides are one of the most important types of natural hazards during monsoon in the Himalayan mountainous region of India, the study concludes that the landslides are due to a combination of both natural and human related causes and that effect 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 and provides an illustration of the way that such ideas may interact productively with hazard management, Tectonic plates are able to move because the Earth's lithosphere has greater mechanical strength than the underlying asthenosphere.

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

Authors:

1. *University of Lucknow, Uttar Pradesh,INDIA*

Introduction

In India various types of landslides occur in especially in Himalayas, particularly in monsoon season, including block falling, debris flow, debris slide, rock fall, rotational slip and crash. A landslide is the gravitational undertaking of a mass of rock, or mass of earth or fragments, downhill on a hill. It generally occurs when a hilly slope becomes unstable due to natural reasons such as ground water pressure acting to destabilize the slope, volcanic outbreaks, quakes, erosion, etc. Landslides are activated by heavy rainfall, landslides cause simple damage to lives and property while also causing disruption in communication systems and movement of road traffic, Landslides in India are considered a major hazard in most hilly and mountains regions as well as in steep river banks and coastlines. The causes of landslides in India are not much different from the world, but there are some individualities, important factors considered to be responsible for causing landslides- Slope instability due to removal of lateral and underlying support, indiscriminate chopping down of trees, Slash and burn cultivation practices in hills, Road construction and mining activities, With increasing population pressure, there is an increase in grazing activities, urbanization which reduces dense natural evergreen forest cover, Due to these activities the ecological balance is disrupted, thereby resulting in loosening of the soil, Under conditions of heavy rain.

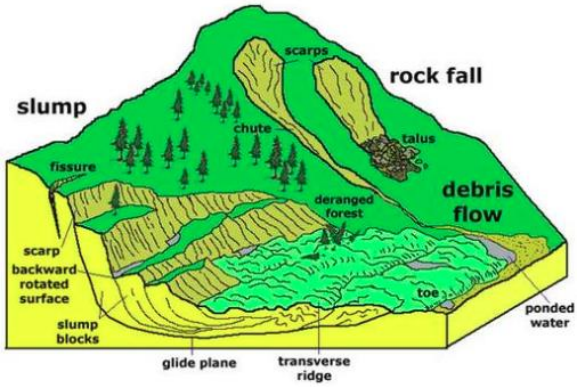

Figure No. 1 Hilly Areas like above are More Prone to Landslides

Causes of Landslides

Landslide Triggers - Cloud burst (200-1000mm/day), Uncontrolled flow of water on slope surface from over flooded steep gullies, Toe cutting may activate failure by overtopping of rock blocks or slides in colluvium, Earthquake, Blasting 11, Flash flood due to glacial lake outbursts

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) Erosion Process- Blocking of natural drainage, High flow velocities in steep gullies Pore water pressure Geological conditions- Mineral composition, rock type, structure etc (Shrestha B.D, 2000)

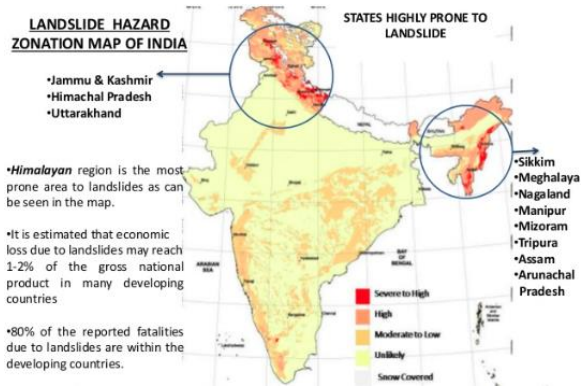

Figure No. 2 States Highly Prone to Landslides

To ensure that such areas of interest are given equally visibility in the forum, the organizers have grouped the contributions under the category of "General Landslide Studies". Herein readers will find a collection of interesting but different submissions on a wide range of key issues. In common, of course, is the underlying theme of landslides, but beyond that the aspects covered are deliberately unique (Bobrowsky Yin and Strom 2015).

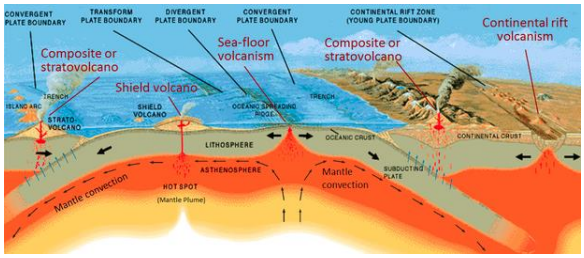

Figure No. 3 Tectonics Plates Beneath the Earth Surface

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 that general landslide" session for the 3rd World Landslide Forum are presented topics range from early warning systems and modelling to Geomorphology and solid waste disposal settlements to flow mechanics and landslide. Susceptibility mapping. All the topics link issues, observations and solutions to slope instability related topics.

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 attempt has been made to generate LSZ map of the study area using bivariate statistical modified Information Value (InfoVal) method in a small watershed in the Himalayas. The various causal factors responsible for landslide occurrence e.g., slope, aspect, relative relief, lithology, structure (confirmed thrusts, faults), lineaments, land use and land cover, distance to drainage, drainage density and anthropogenic factors like distance to road that are associated with landslide activity, have been considered and the corresponding thematic layers have been generated using remote sensing and GIS techniques. The accuracy of the LSZ map has been evaluated using frequency ratio and success rate methods and indicates more than 85% of landslide prediction accuracy. It is hoped that the zonation of landslide susceptible areas may help in effective and efficient management of landslide related hazard.

Sarkar et al. (1995), concluded that the identification and classification of hazard prone areas according to the degree of actual or potential danger is a necessary step in hazard assessment. This paper describes the methods of landslide hazard zonation that were tested in the Srinagar-Rudraprayag area of the Garhwal Himalaya. The factors of slope angle, lithology and distance from a major geological discontinuity, land use, drainage, relative relief, and existing landslides all contribute to slope instability. These are analyzed in relation to landslide frequency and are numerically weighted based on their relative importance. From this, the study area has been classified into five zones of instability and the results have been verified in the field.

Tohari (2018), studied that rainfall-induced landslides pose a substantial risk to people and infrastructure. For this reason, there have been numerous studies to understand the landslide mechanism. Most of them were performed on the numerical analysis and laboratory experiment. This paper presents a review of existing research on field hydrological condition of soil slopes leading to the initiation of rainfall-induced landslide. Existing methods to study field hydrological response of slopes are first reviewed, emphasizing their limitations and suitability of application. The typical hydrological response profiles in the slope are then discussed. Subsequently, some significant findings on hydrological condition leading to rainfall-induced landslides are summarized and discussed. Finally, several research topics are recommended for future study. Previous laboratory and field studies of the hydrological response of soil slopes lead us to have a better understanding on the hydrological condition leading to landslide initiation. While most of studies have focused on the measurement of pore-water pressure response, some other studies have also shown that measurement of soil moisture content can also improve the understanding of the hydrological response of a soil slope to rainfall infiltration.

Keefer (2002), studied on post-earthquake field investigations of landslide occurrence have provided a basis for understanding, evaluating, and mapping the hazard and risk associated with earthquake-induced landslides. This paper traces the historical development of knowledge derived from these investigations. Before 1783, historical accounts of the occurrence of landslides in earthquakes are typically so incomplete and vague that conclusions based on these accounts are of limited usefulness. Beginning in the mid-twentieth century, when the use of aerial photography became widespread, comprehensive inventories of landslide occurrence have been made for several earthquakes in the United States, Peru, Guatemala, Italy, El Salvador, Japan, and Taiwan. Techniques have also been developed for performing "retrospective" analyses years or decades after an earthquake that attempt to reconstruct the distribution of landslides triggered by the event. The additional use of Geographic Information System (GIS) processing and digital mapping since about 1989 has greatly facilitated the level of analysis that can applied to mapped distributions of landslides. Beginning in 1984, syntheses of worldwide and national data on earthquake-induced landslides have defined their general characteristics and relations between their occurrence and various geologic and seismic parameters. However, the number of comprehensive post-earthquake studies of landslides is still relatively small, and one of the most pressing needs in this area of research is for the complete documentation of

landslides triggered by many more earthquakes in a wider variety of environments

Conclusion

In the present paper, we have discussed reviews on various landslides in india that occur every year causing huge loss of human life and property in mountainous areas. 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. Controls of landslide volume are not necessarily the same as those for landslide initiation. Hence, the suite of variables that correlate with landslide outfall size are not necessarily the same as those linked with landslide initiation. After critical analysis, many scientific measures were developed in order to arrest the landslide and control erosion. The scientific finding like soil testing and vegetation study give ideas for the selection of planting material which could be best fitted with the soil and prevailing environmental condition of landslide zone and outputs and result of landslide and erosion control studies can be tried in similar sites in the state in the first instance and further may improve for replication to other hilly stations in the country.

References:

Bobrowsky, Peter, et al. “Introduction: General Landslide Studies.” 7 May 2015, www.researchgate.net/publication/275963582_Introduction_General_Landslide_Studies

Ray, A. K., and R. J. Pandey. “LANDSLIDE HAZARD ZONATION MAPPING: A CASE STUDY OF UTTARKASHI DISTRICT, UTTARAKHAND, INDIA.” Department of Geography and Natural Resource Management School of Sciences, 2016, gbpihedenvis.nic.in/ENVIS Bullitin/ENVIS Bulletin (Vol. 24, 2016)/Landslide_hazard_AK_Roy.pdf.

Sarkar, Shantanu, and D. P. Kanungo. “Landslide Hazard Zonation: A Case Study in Garhwal Himalaya, India.” 18 Sept. 2015, www.researchgate.net/publication/271693655.

Sarvade, Shivaji, et al. “30/7 MALIN LANDSLIDE: A CASE STUDY.” ResearchGate, 30 Sept. 2017, www.researchgate.net/publication/320124781_307_MALIN_LANDSLIDE_A_CASE_STUDY.

KUNDU, S, et al. “GIS-BASED STATISTICAL LANDSLIDE SUSCEPTIBILITY ZONATION: A CASE STUDY IN GANESHGANGA WATERSHED, THE HIMALAYAS.” Esri India, 2011, www.esriindia.com/~/media/esri-india/files/pdfs/events/uc2011/ papers/DM_UCP008.pdf.

Pascual, Tanya. “A Report on the Causes and Effects of Landslides in Dhunche, High Mountain Himalaya, Nepal.” Http://Lib.icimod.org, lib.icimod.org/record/10822/files/621.pdf.

KEEFER, DAVID K. “INVESTIGATING LANDSLIDES CAUSED BY EARTHQUAKES – A HISTORICAL REVIEW.” SpringerLink, Feb. 2002, link.springer.com/article/10.1023/A:1021274710840.

Tohari, A. “Study of Rainfall-Induced Landslide: a Review.” Global Colloquium on GeoSciences and Engineering, 2018, iopscience.iop.org/article/10.1088/1755-1315/118/1/012036/pdf.