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IMPACT OF LANDSLIDE ON HILL SLOPE SETTLEMENTS IN NANITAL TOWN

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ABSTRACT

Nainital town People their demands are ever growing but the availability of land is limited. The quality of land is different from place to place. People started encroaching the common lands to build up commercial areas, housing complexes in the urban areas in the unsuitable areas. Today the vast changes in the land use pattern also reflect the cultural changes in the society. Land degradation, desertification, soil erosion and landslides are the major threats to the environment because of

the constructional activities in study areas.

KEYWORDS :damage to property , hill Slope Settlements , geological phenomena .

INTRODUCTION

Mostly landslide hazards in mountainous terrain often occur during or after a heavy rainfall resulting in loss of life and damage to property. Land use and land cover mapping is thus very important for resource evaluation. Landslide also known as a land slip is geological phenomena that include a wide range of graveled movement, Such as rock fall, deep failover of slope and shallow debris flow landslide can occur offshore, coastal and onshore environment. Although the



action of gravity is the primary driving force for a landslide to occur, there are other contributing factors affecting the original slope stability.

STUDY AREA:

Nainital is popular hill station in the Indian state of Uttarakhand. Situated of an altitude of 2084m above sea level and located at 29° 38'N latitude and 79° 45'E longitude. Nanital is set in a valley containing a pear shaped lake, approximately two mails in circumference and surrounded by mountain

of which the highest are Naina peak (2615m) on north, Depoatha (2278m) to west and Ayarpatha (2278m) on the south. Nainital is mordent temperature in summer i.e. a maximum temperature 27° c and minimum temperature 7° c. In the winter Nainital receives snowfall between December and February with the temperatures varying between a maximum of 15° c and minimum 3° c. As of the 2001 Indian censuses Nanital had a population of 38559 and also houses are 2856 to distributed 13 wards.

REVIEW OF LITERATURE:

The Kumaun Hills came under British rule after the Anglo-Nepalese War (1814-16), but the hill station town of Naini Tal was founded only in 1841, with the construction of the first European house (Pilgrim Lodge) by P. Barron. In his memoir, he wrote: "It is by far the best site I have witnessed in the course of a 1,500 miles trek in the Himalayas." In 1846, when a Captain Madden of the Bengal Artillery visited Naini Tal, he recorded that "houses were rapidly springing up in most parts of the settlement: some towards the crest of the limitary ranges were nearly 7,500 feet above sea level: the rugged and woody Ayarpatta was being gradually planted and that the favourite sites were on the undulating tract of forest land which stretched back from the head of the lake to the base of China and Deopatta (Camel's Hump). The Church, St. John in the Wilderness, had been built ..." Soon, the town became a health resort favored both by British soldiers and by colonial officials and their families trying to escape the heat of the plains. Later, the town also became the summer residence of the Governor of the United Provinces. In view of the importance of the town as a popular hill resort, several earth scientists have studied the landslide problem of the town time and again. R.D.Oldham (1880) was the first to investigate into the causes of failure of the slopes in the Nainital valley. Subsequently, the hill slopes instability was studied by Middlemiss (1890), Greisback (1895), Holland (1897), Coulson (1928), Auden (1942) and Nautiyal (1949). Hukku and Jaitle (1966) and Hukku et.al. (1966-67) carried-out geological mapping of Nainital area on 6"=1mile scale. Subsequently, Srivastava (1967-68), Ashraf (1978), Jaitley (1979-80) studied the problem of slope instability around the township. Layer Pant and Kandpal (1988-89) studied the instability of the adjoining Balia nala which drains the lake area. The Nainital area forms a prominent physiographic unit of Kumaun Himalaya situated in a synclinal basin (Auden, 1942). Middlemiss (1890) was the first to study the geology of Nainital area and the carbonate rocks in and around Nainital area were identified as Krol by him. Holland (1897) gave a more detailed account of the area. Subsequently, Auden (1942), Nautiyal (1949), Hukku and Jaitley (1964) and many other workers have contributed towards understanding the stratigraphy and structure of the area. The area around lake is occupied by the rocks of Krol formation. The Lower Krol formation is represented by thinly bedded, sheared, variegated slates/shales, marls with subordinate bands and lenses of limestone which are mainly exposed in the eastern and northeastern parts of the lake basin. The western, southwestern and southern portions of the area are occupied by limestone/dolomite and red shales of Middle Krol and Upper Krol members and slates and phyllite of Tal formation.



Figure 1: In front of Lovers Point in Nainital Town



Figure 2 : Ward No. Seven In Nainital Town

OBJECTIVE:

- 1.To study relief future in Nanital town
- 2.To find out the landslide causes in Nainital town.
- 3.To find out landslide effects on foothill settlement in Nainital town.

HYPOTHESIS:

Landslide will be some town center may be possible in Nanital and many infrastructure damages such as Houses, High court building and Inter College Tllital etc.

METHODOLOGY AND DATA COLLECTION:

Both Primary and secondary data are collected in order to fulfill the objective of the present study. Information related to land sliding preparedness is collected through relevant data, interview,. Secondary is collected through research paper, Internet, Censes handbook etc. The collected data is analyzed and interpreted and feasible conclusion disaster about landslide.

CAUSES OF LANDSLIDE:

Landslide occurs when the stability of the slope changes from a stable to unstable condition Natural following causes of landslide in study area:

- Heavy rainfall and water pressure acting to the destabilize the slope.
- Erosion the top of a slope a streams system.
- Earthquake – caused liquefaction destabilizing slopes and adding load to barely stable slope.
- Deforestation and construction which destabilize the already fragile slope

DENSE VEGETATION:

In the present framework of land use/ land cover classification system, this category includes dense type of vegetation. Due to many anthropogenic activities and some other natural processes land become degraded. In the study area. Forest Blank: Areas in the forest that are completely devoid of trees are Forest blanks. These are areas where natural or climax type of vegetation is dominated by grasses or grass like plants and non grass like herbs. The total area comes under scrubby grassland vegetation cover is geographical area. Barren rocky land: The barren rocky lands are unsuitable for any production which is characterized by exposed massive rocks and excessive accumulation of surface stones. Barren rocky Barren Non-Rocky land: Barren Non rocky areas are those areas which have no rocks and grass cover and have been stabilized as wasteland in the hilly region. Built up area: All manmade constructions covering the land surface are included under this category. These are human settlements comprising residential areas, transportation networks, utilities and services etc. Nainital is the major town or city like settlement in the study area.

IMPACT OF LANDSLIDE :

In the 1880 landslide occur in Nainital a major impact on road, human settlement and devastating amenities and facilities. Around the Nainital town many time landslide are there like Sukhatal, Krupatal, site of Bhavali road and Tuta pahad. In future shall be some landslide point like Naina pic, High court, site of Haldwani road, and Inter Government College Tallital.

The Nainital landslide resulted in a very severe impact on the community. They did not want to come to Nainital due to the destruction of the town as the environment was severally impacted. Over time the community of Nainital was the losses of people in 1880, 1866, 1879 landslide occurred. Nainital that was affected rebuild and restore the morals of the ones who had lost love and people close to them. Following impact will be there.

1) Damaging the natural environment of the effected Nainiital areas. When a part of a cliff of the

landslide break off it engulf everything that goes in its path.

- 2) The landslide that there was the loss of top soil.
- 3) Several florae were not able to grow due to the lack of the soil and stability in the ground.
- 4) There was the great loss of vegetation and trees.
- 5) There are habitats of different species of fauna that were damaged and most were entirely demolished.
- 6) Damages of infrastructure such as hill slope settlement, foothill settlement, Lake Site settlement and Mal road market, Government offices, high court building, Rest house etc.

REMEDIES AND SUGGESTIONS:-

- 1) Improving surface and subsurface of drainage.
- 2) Excavating the head areas.
- 3) Buttressing the toe.
- 4) Contraction piles and retaining walls.
- 5) Removal and replacement.
- 6) Preserving vegetation.
- 7) Rock fall protection.

SUGGESTIONS:

On the basis of analysis and observation regarding the present situation about the landslide preparedness, it has been identified that people causal approach to the subject. The study has aim to analysis and highlights the idea of awareness that will work to create safety. The most important strategy to mitigate landslide impact is to place safety on the main agenda of the study area.

The concept of adopting safety plan is a suggestive model to carry to safety insensitive in the study area

Coordination committee such as awareness generation, teamwork, safety team and side security team most be formed respective responsibilities.

Description of mitigation steps for identified potential landslide.

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