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PRESS RELEASE

RESEARCH STORES

Beware! Landslides about to occur along the Tehri-Uttarkashi Highway

Research by scientists of Department of Applied Geology, IIT ISM Dhanbad, has revealed that at several locations along the Dharasu-Uttarkashi Highway in the Uttarakhand Himalayas, landslides and slope failures are about to occur. The highway connects Tehri and Uttarkashi and is an important transport way that supports business, pilgrimage, infrastructure development and international tourism round the year. A rigorous comprehensive multiparametric analysis of the failure conditions of the hill slopes along the highway had been performed recently to reveal that twelve locations (Fig-1) along the highway manifest conditions of various degrees of instability with three locations particularly at the verge of failure and require immediate mitigation.

The research was carried out by Dr. Mrinal Kanti Mukherjee, Associate Professor and Head of the Department of Applied Geology, along with his Ph.D Student Mr. Anil Kumar Gupta. The ground breaking research developed novel stability charts that combines several geomechanical slope classifications and integrates with it, rock microstructural parameters of failure to identify slopes that are about to fail. The highway passing through such locations are extremely vulnerable and require immediate stabilization operations and precautions.

The findings of the research has been recently published in the prestigious journal *Rock Mechanics and Rock Engineering*, on 30th March 2022 (https://doi.org/10.1007/s00603-022-02846-3)

Prof. Mukherjee, a renowned and experienced structural geologist and researcher in engineering geology, explains, that during field geological investigations of the slopes of the studied area, they had observed that, several locations along the highway including their area of study and beyond, have suffered landslides and road-cut slope failures. The types of failures include small blocky slides and topples, extensive plane and wedge slides and large shallow circular failures (Fig-2). These road-cut slope failures have caused several incidences of property and life loss in the area. Highway constructions and maintenance along these sectors, therefore, becomes extremely challenging. Surprisingly, no comprehensive study in terms of predictive assessment of stabilities of the road-cut slopes existed before, in this sector, to address the safety of the highway. In this context, the present research findings fill the gap and impacts directly to the safety of the highway and environment.

As a part of his ongoing research, Prof. Mukherjee now aims at developing early warning systems that might serve as a precaution to maintain the safety of the highway against the slope failures.

Fig. 1 Geological Map of the study area. Studied slope locations are marked as L1, L2… etc on the Dharasu-Uttarkashi Road section (NH 108). The Dharasu bend (indicated by arrow) is a junction between the two road sections: one leading to Yamunotri Glacier through Khumla Gad in the north-west and the other one leading to Uttarkashi in the north-east

Fig-2

Fig. 2 Failed slopes in the Dharasu–Uttarkashi road section in the study area. For locations refer to Fig.1. (a) Wedge failure just occurred producing slid-down and rolled down rock boulders at location L8. Traffic has been halted for clean-up operations. (b) Spalling of rock and toppling failure at location L10. Ongoing creep movements on slope are evident from rotation of tree (indicated by arrow) on the cut-slope. (c) Extensive occurrence of shallow landslides composed of mixed soil and rock fragments at location 800 m north of Dharasu bend. Arrow indicates the road level. (d) Shallow landslides at 150 m north of Dharasu bend. Arrow indicates road level

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