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Relationship between rock weathering and geological structures in the Dumre Besei landslide, Lesser Himalaya Nepal

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Dumre Besi landslide is one of the most active landslides along Mugling Narayanghat road section of Nepal Himalaya that was initiated during the monsoon of 2003. The external trigger of this landslide is heavy rainfall, however geological structures and rock weathering have played the key role in the formation of this landslide. The main lithology of the landslide zone is thinly laminated light grey siltstone, grey sandstone (quartzite), bluish grey to white phyllite, black carbonaceous shell, and dolomite. A thrust fault passes through the center of the landslide, which has created a thick deposit of loose and weathered rock material and has developed very thick shattered zone, where weathering is very intense. The rocks in the landslide zone are divided into 5 zones according to the severity of weathering as none, slight, moderate, severe and complete based on field and laboratory analysis.

Laboratory analysis suggested that the chemically weathered rocks are significantly rich in clay minerals. Formation mechanism of clay minerals was analyzed by various techniques as XRD, XRF and thin section analysis and it was found that most of the clay minerals are formed by weathering of rocks. The main clay minerals thus formed are chlorite, smectite and vermiculite. These clay minerals reduce the rock strength and also smectite has a swelling property when water is added into it. The weathering and thrusting has created a thick zone of loose material that is rich in clay minerals, which flows as the debris in every monsoon season. Also, the slope angle, topography, rainfall and ground water are responsible for the formation of this landslide.

Keywords: Landslide, Himalaya