

Landslide and Flood Hazards Consequences and Community Based Management Initiatives in Nepal Himalaya

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INTRODUCTION

The loss due to landslides and related problems in the Himalayan region alone constitutes about 30% of the world's total landslide-related damage value (Li, 1990). Along the Himalayan chain of 2400 km, landslides (includes shallow, deep seated and debris flows) occur extensively and in particular within Nepal (Paudel, et. al.). In an average, about 300 people of people are dying every year from landslide and flood hazards (National Planning Commission, 2012). In this study, two different ecological regions are selected to assess the landslide and flood hazards consequences and its management practices adopted by the institutions and communities. In the mid hill region, frequent shallow landsliding events are common while; in southern part of the country (commonly called Siwalik Terai) flood hazard is more prominent.

METHODOLOGY

Two watersheds viz. Sisneri in Mid hill and Pasaha in Siwalik Terai regions is selected based on the damaging effects. Intensive field inventory, GIS based mapping, interaction with the local communities, site assessment/soil sample analysis is done. Terrain analysis is done to examine the stability of the area. Daily and cumulative rainfall amount is observed to examine the occurrence.

SITE CONDITION

Sisneri watershed comprises low-medium-grade metamorphic rocks of the Lesser Himalaya. The Lesser Himalayan Zone lies to the north of the Main Boundary Thrust. The Lesser Himalayan rocks are represented by phyllites, slates, quartzites, limestones and dolomites (**Fig.1**). It is further subdivided by disconformities. The soils found in the study area are mainly three types: (1) alluvial (2) colluvial and (3) Residual. The slope is steeper (average watershed slope >30°). In Sisneri, cumulative rainfall amount of 370 mm of six days (**Fig. 2**) have triggered the majority of slides. Due to the lack of intensity measurement at the nearby station, it was not possible to co-relate the intensity- duration relationship. The Pasaha site comprises mainly sandstone, mudstone and colluvial deposits. This area receives an average annual rainfall of about 2500-3500 mm and is concentrated during monsoon seasons. The area is mainly affected by the inundation and flooding rather than slope failures. In flooded area, there is sharp change in topographic gradient and velocity suddenly changed (decreased) and river bank area are prone sites. The river course is changing in due course of time and damaging scale is very significant.

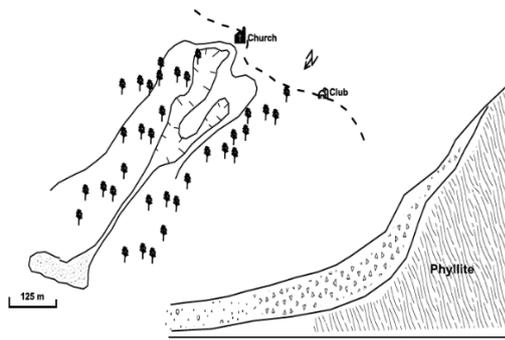


Fig. 1 Generalized view of sliding site

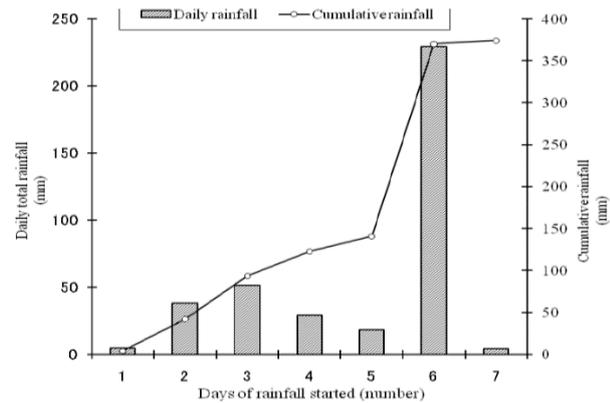
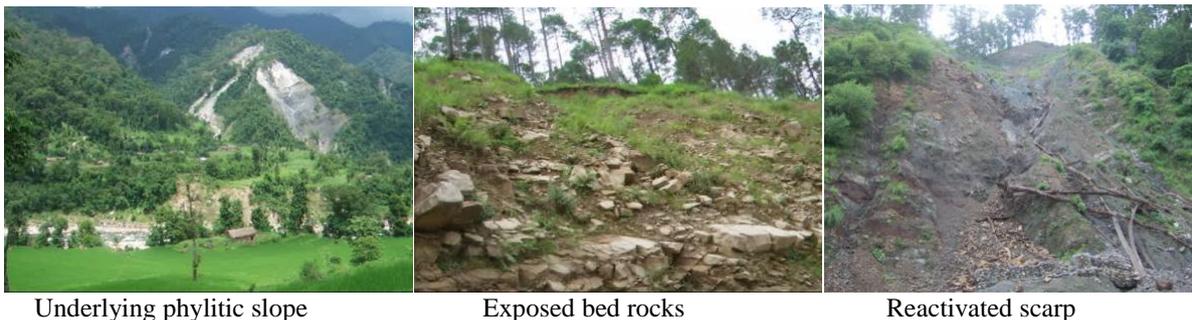


Fig. 2 Daily and cumulative rainfall condition (Sisneri watershed area)

MAIN FINDINGS

1. Exposed bed rocks are common. Forested slopes are sliding mainly in phyllite slopes.
2. Steep topography, high drainage density, unmanaged drainage, seepage, thrust joints, sudden change in topographic conditions, and manmade factors are favoring for sliding.
3. There is large scale impacts (up and downstream) caused by flood hazards.



Underlying phyllitic slope

Exposed bed rocks

Reactivated scarp

Fig. 3 Different site situation of the sliding areas

CONCLUSIONS

Landslide and flood hazards are major geo-hazards and hazard mapping concept is still not in practice for management decision. Community based hazard mitigation are in practice. There is heavy dependence on agriculture and poor people are living adjacent to flood prone areas. There is no concrete torrent control law and land use policy to manage the appropriate land use.

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