

Paper Number: 2072

Ground Penetrating Radar Studies and Influence of Anthropogenic Factors on Some Landslides of Northeast India

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Ground Penetrating Radar (GPR) studies in a few landslides reveal that subsurface configuration and thickness of overburden soil column play a vital role in the process of slope failure. Although geological, geotechnical and geo-environmental studies about landslides and slope instability phenomena, along the hilly routes of Manipur and Nagaland states of Northeast India especially along the National Highways, indicate multi parametric causes such as weak lithology characterized by fracturing and jointing, rugged terrain and steep slope, excessive and unsystematic land use, ill-maintenance of artificial drainage system, quarrying on slopes adjacent to the highway, slope cutting, good rainfall, toe erosion and fluvial down cutting; thicker mantle of waste on slopes compounds the problem of landslide. GPR surveys reveal that overburden soil columns having a thickness of 2m and above are more prone to slides than those less than 2m in moderate to steep slopes.

Besides, analyses of basic geotechnical properties of the slope forming soils and role of anthropogenic factors further indicate that land uses of soil increase the soil porosity thereby allowing absorption of larger volume of moisture during rainy season helping in causing slope failure. Determination of moisture content variation of some landslides, over a period of one year, indicates higher moisture contents during the months of June, July, August and September, commonly exceeding the plastic range with prolonged saturation period, which eventually leads to slope failure during the rainy season. Evaluation and analysis of slope instability in regard to construction of heavier RCC buildings on otherwise critically stable slopes also indicate reduction in the safety factor assisting in destabilisation of slopes as evident from the study of some landslides conducted by Pradipchandra et al. [1].

References:

[1] Pradipchandra et al. (2008) Bulletin of the Indian Geologists' Association 41: 25-39

