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Study on the difficulties in proposing rainfall thresholds of landslides in Sri Lanka

Udeni P Nawagamuwa

Department of Civil Engineering, University of Moratuwa, Katubedda, Moratuwa

Rainfall thresholds can be defined on a physical (process-based, conceptual) or empirical (historical, statistical) basis. However, a developing country like Sri Lanka, has its own difficulties in determining rainfall thresholds compared to developed countries. Even with such difficulties, Sri Lanka stands in the forefront in landslide studies due to the number of attempts made in this regard, though the threshold values proposed are sometimes questionable. In this paper, the existing thresholds are discussed and compared with other regional and global relationships.

Rainfall data corresponding to historical landslides were collected from the Department of Meteorology and the National Building Research Organization. However, it revealed that such available rainfall data could be from the closest rain gauge station to a particular landslide and sometimes the distance to this particular location was several kilometers. Sri Lanka has a very diverse rainfall system and this kind of assumption could lead to a wrong conclusion.

Rainfall threshold values vary from region to region due to differences in existing soil characteristics and climatological patterns in different areas. Therefore, a complete study of the rainfall patterns in landslide prone areas and their records of landslides will help predict reasonable threshold values of rainfall. These values could be used as a tool for landslide forecasting. It was also observed that the geological data found after a particular landslide would not provide sufficient information of the overburden as the slide has already made the overburden soil a complex mixture.

Collection of rainfall and other related data was found to be a very challenging task. Though this paper gives some concepts of early warning and threshold limits, it should be emphasized that proper data collection is very vital in delivering better predictions. It is recommended that more scientific efforts must be made on this important subject. Further, hourly rainfall data are needed for the development a proper rainfall threshold which can even be comparable with other global standards.

Lack of avenues to obtain rainfall data, inability to correlate rainfall data with geological conditions due to lack of data and not having rain gauges which can measure hourly rainfall values in locations where landslides have happened could be considered as major difficulties Sri Lanka has in the development of proper rainfall threshold values. The antecedent rainfall should also be taken into account when defining rainfall thresholds.

udeni@uom.lk; nawagamuwa@gmail.com Tel: 2650567/8, 2562932, 0773595177