NEWS AND NOTES

Rajamala Landslide: Continuation of a Never-ending Landslide Series – Sajin Kumar, K.S., University of Kerala. *E: (sajinks@keralauniversity.ac.in)* and Thomas Oommen, Michigan Technological University, USA. *(E:toommen@mtu.edu)*

A massive landslide occurred at Nayamakkad(Pettimudy) tea estate (77.01ºE longitude and 10.17ºN latitude), near Rajamala in Idukki district, Kerala, on the wee hours of 7 August 2020 (Fig. 1). This landslide killed 70 people, apart from demolishing four hutments (called '*layams*' - quarters for tea garden workers) and uprooting several trees and poles. This landslide travelled swiftly for about 1.3 km and finally debouched into Kanniyar river after destroying the hutments. The landslide swollen in size as it proceeded downhill. In Kerala, landslide occurrences are common during the rainy season, but it is the third consecutive year the state is experiencing catastrophic landslides owing to anomalous rain. Usually, the cumulative rainfall for the season is in tandem with the average, but what the last three years witnessed was sporadic high-intensity rainfall, clustered in a few days. The high-intensity rain is the trigger for the Rajamala landslide where the 5-day antecedent rainfall is 766 mm and a daily rainfall of 167 mm. The previous day of landslide occurrence the rainfall was 309 mm (Table 1; *Source*: Eravikulam National Park Range Office).

Fig.1. View of the demolished *layams* and progress of search operations for corpses (*Photo courtesy: Dhanushkodi, Chinnar*)

Table 1. Rainfall of Rajamala during the first week of August 2020

Date	Rainfall (mm)
1-8-2020	22
2-8-2020	58
3-8-2020	111
4-8-2020	195
5-8-2020	93
6-8-2020	309
7-8-2020	167

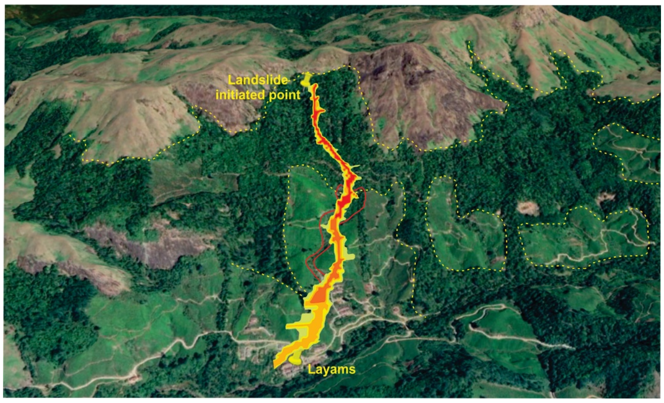

Fig.2. Pre-event Google Earth image showing the location of landslides. Landslide runout was modeled using Laharz and draped over Google Earth image. Yellow dotted line indicates boundary between different land use category and red line indicates the suspected landslide.

From the analysis of the pre-event images of Google Earth, it is observed that the landslide is confined to a barren flat-topped hill composed of Precambrian crystalline rock (Fig. 2). The water pooled across the flat-topped hill was surcharged to the nearest gully, which was a geomorphic hollow or zero-order basin. It is in this geomorphic hollow the landslide occurred. The landslide initiation point is the boundary between two land use categories: barren rocky outcrop and forest plantation.

The morphological interpretation of the terrain using the same set of Google Earth images also revealed a scoop-out portion, suspected to be a paleo-landslide, confining to the same geomorphic hollow but in the downstream side (Fig. 2).

The repeated history of catastrophic landslide calls for an urgent need to reduce the risk of such events. In an area like Kerala that is prone to landslides and where the temporal distribution is restricted to monsoon season, the strategy should be the creation of a landslide susceptible map, demarcating the landslide-prone areas, using latest remote sensing data products and tools. This should be supplemented with a network of real-time rain gauge stations for providing early warning. Developing accurate landslide susceptibility mapping and early warning systems based on the rainfall thresholds is a critical need for safe and sustainable planning and development of ecologically sensitive regions of Kerala.

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