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Threshold Rainfall Ranges for Landslide Occurrence in Matara District and Findings of a Social Survey on Emergency Preparedness

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Abstract

Matara district has faced several devastating landslide events within past few decades. Impacts of those landslide events would have been reduced if the threats had been identified early enough and the early warnings were disseminated at the right time. The objectives of this research were (a) to identify the effects of antecedent rainfall on the probability of landslide occurrence and (b) to analyse the knowledge of the community on landslide response, preparedness and landslide warning signs in general. During this study the major landslide events occurred in 2003 and 2017 were studied for the rainfall impact. The landslide locations were collected and the rainfall relevant to each and every landslide location was extracted by using a GIS-based interpolation method. Simultaneously a social survey was conducted to achieve the second objective described above. Starting from the daily rainfall of two days prior to landslide event (i.e. Day 3) till the daily rainfall of landslide day (Day 1), there was an identifiable pattern. There is more than 90 percent chance for a landslide to occur, when the rainfall of the day of the landslide event is close to 300 mm (in our case 290 mm) or above with a rainfall of ~80 mm or above on the previous day (Day 2). The majority of the events (over 94 percent) had a daily rainfall of ~80 mm or above on Day 3. The cumulative rainfall of the landslide day up to three days prior to the landslide event shows a significant pattern (Day 1-Day 4). There is more than 94% chance for a landslide to occur when the total rainfall received on Day 1 and Day 2 exceeds 375 mm. Overall, when there is a rainfall event of ~80 mm or over, people need to be warned/cautions about a potential landslide within the next three days, if the rainfall continues to be high. Social survey shows that during 2017 event/s people were more prepared for landslides compared to 2003, but still there are many steps to be taken in terms of response, preparedness and early warnings.

Keywords: Landslides, Rainfall pattern, Early warnings, Community preparedness