408/D

Hydrology, land use pattern and soil physical properties in Meeriyabedda landslide area, Koslanda

T.M. Paranavithana,[1] E.P.N. Udayakumara,[1] H.M.I. Prasanna,[2] and L.V. Ranaweera*[1]

[1] *Department of Natural Resources, Faculty of Applied Sciences, Sabaragamuwa University of Sri Lanka, P.O. Box 02, Belihuloya.,*
[2]*Department of Surveying and Geodesy, Faculty of Geomatics, Sabaragamuwa University of Sri Lanka, P.O. Box 02, Belihuloya.*

The Meeriyabedda landslide in Koslanda which occurred on 29th October 2014 can be considered as one of the most catastrophic landslides in Sri Lanka. It affected 330 people of 57 families. Thus, this study was focused on identifying the triggering factors for the prevailing vulnerability of the area with special focus on hydrological behavior, land use changes and selected soil characteristics. Water yield was estimated for the Eruwendumpola Oya watershed where the landslide occurred and its sub-watersheds using the Integrated Valuation of Ecosystem Services and Tradeoffs (InVEST) water yield model and Geographic Information System (GIS). Rainfall variability was determined by using daily (October 2014) and monthly rainfall data (2003-2016) of three surrounding weather stations. The Isohyte method was employed in order to calculate the mean rainfall across the study area. The Seasonal Autoregressive Integrated Moving Average (SARIMA) model was used for rainfall time series analysis. Selected soil physical properties were measured using standard methods. Results show that in Meeriyabedda landslide area, main drainage patterns are parallel to the long axis of the landslide while sub-patterns are dendritic. Tea occupies 76% from total vegetation.The slope angle of the head area varies from 15-30^0. The major soil type is poorly graded sand with silt, which has the tendency to show liquefaction during spells of heavy rainfall. Bulk density of soil varies between 1.27 - 0.99 g/cm^3. Rainfall received on the day of the landslide was around 10 mm and exceeded 375 mm within the week. Water yield of October in the sub-catchment where the landslide occurred is 34 % from the total water yield of the year, 2014. Time series analysis shows increasing trend of rainfall. Change of natural flow patterns and the main vegetation type, tea and hydrology have a significant negative influence on the stability of the landslide area.

Keywords: hydrological behavior, landslide, land use, soil, water yield

Acknowledgment: This research was funded by Sabaragamuwa University research grant (SUSL/RD/2016/17) to L.V.R, E.P.N.U, and H.M.I.P.

E-mail: laliwr@appsc.sab.ac.lk