

Study of Hydrological Behavior of Nilwala Upper Catchment for Flood and Flood Hazard Mapping

Pushpakumara DLWS¹, Navaratne CM¹ and Gunasena CP²

¹Department of Agricultural Engineering, Faculty of Agriculture, University of Ruhuna, Mapalana, Kamburupitiya

²Department of Geography, Faculty of Humanities and Social Sciences, University of Ruhuna, Matara

Abstract

The study intended to determine the effect of hydrological behavior of the *Nilwala* upper catchment corresponding to the flood, to prepare maps for the flood inundation and the effect of damages to agriculture with reference to the major historical floods and, to identify flood management and flood-disaster mitigation strategies.

Long-term historical time series data on stream flow at *Bopagoda*, and rainfall at *Mawarala*, *Panilkanda*, *Aninkanda* and *Arpthop* were analyzed to discern changes in hydrologic effects at *Akuressa* and *Aturaliya* divisional secretariat divisions, which are frequently and considerably affected by floods. GIS package "*ArcviewGIS 3.2a*" was used for calculations of flooded area and mapping. Damages and flood level data were collected by a field survey. Flood frequency analysis and regression model were used to predict the flood events. Changes in rainfall and runoff pattern and flow regime during 30 years were studied.

The rainfall varies from 2500mm to 4000mm with an average annual rainfall of 3386.8 mm. An increasing trend of annual rainfall is shown while runoff and runoff to rainfall ratio are decreasing due to decreasing the base flow runoff. However, in short term, there is a linear relationship between rainfall and runoff. Frequency analysis resulted 249.3, 332.1, 441.5, 524.3 discharges in cusec for 5 year, 10 year, 25 year and 50 year return periods respectively. The return period of flash flood may occur by 25 to 30 years. The flood is mainly affected to paddy cultivation in the area. Future mitigation measures should be focused on the routing high intensity storm runoff and adjust the cultivation practices according to rainfall pattern.

Keywords: flood hazard mapping, flood mapping, hydrological behavior and frequency analysis