



## Investigation of Mode Canal Flash Flood Mechanism Using Hydrodynamic Modelling Approach

K. Jeewanee<sup>a</sup>, N.D.P. Ransara<sup>b</sup> and G.H.A.C. Silva<sup>c</sup>

*Department of Civil and Environmental Engineering, Faculty of Engineering,  
University of Ruhuna*

<sup>a</sup>kandagej@gmail.com

<sup>b</sup>ndpransara@yahoo.com

<sup>c</sup>amila@cee.ruh.ac.lk

### Abstract

Flash floods are becoming more and more common and frequent in many urban areas all over the world. Unplanned urbanization, inadequate and poorly maintained macro and micro drainage systems, shortage of wetlands and lack of awareness can be highlighted as major reasons for flash floods. Nevertheless, according to climatologists there is a significant change in precipitation patterns which cause serious distortion of rainfall extremes due to climate variability. Today, Sri Lanka has no exception with regards to flash floods in urban areas. Mode canal basin which is geographically located at the heart of the city of Galle and frequently confront with flash flood has been selected as the study area of this research. Mode canal basin consists of gently undulating plains and low-laying flatlands with a high density of drainage paths. A rapid urbanization and thereby alteration of catchment characteristics have been taken place within the Mode canal basin. Recently, some research attempts had been made to investigate flash floods in Mode canal basin through 1D hydrological modelling approach. Tidal fluctuation is also a significant parameter within the lower reaches of the mode canal. This paper discusses the development of a 2D hydrodynamic model incorporating the tidal effect. Precipitation data, tidal data and cross section data were collected from various sources as the main required data sets for the development of the model. The SOBEK software had been used in this study. Whole catchment was sub divided into twenty two sub catchments according to the land use pattern variations and contour variations. Eighteen number of SCS nodes were used in upstream and four number of paved nodes were used within the downstream in the rainfall runoff model development. Seventy seven number of cross section nodes and three boundary nodes were also incorporated within the flow model. Initially, 1D model had been developed then 2D model was developed by coupling DEM with 1D model. Subsequently, applicable flood mitigation techniques were investigated through model output. According to the model outputs it can be identified that canal capacity is not sufficient from Julgaha to Minuwangoda Junction. But in front of the Sangamiththa College it can be recognised as a bottleneck within the canal which results frequent inundation. Inadequate drainage capacity is main factor for frequent flash floods within the whole basin. Sedimentation is also a major problem throughout the Mode Canal. Therefore, the expected estimated canal capacity cannot be achieved throughout the canal. In order to minimize the increment of salinity level within Mode canal, it is highly recommended further canal deepening appropriately.

**Keywords:** SOBEK, Mode canal, 1D/2D mode