Stochastic Richelieu River Flood Modeling and Comparison of Flood Propagation Models: WMS (1D) and SRH (2D)

Authors : Maryam Safrai, Tewfik Mahdi

Abstract : This article presents the stochastic modeling of the Richelieu River flood in Quebec, Canada, occurred in the spring of 2011. With the aid of the one-dimensional Watershed Modeling System (WMS (v.10.1) and HEC-RAS (v.4.1) as a flood simulator, the delineation of the probabilistic flooded areas was considered. Based on the Monte Carlo method, WMS (v.10.1) delineated the probabilistic flooded areas with corresponding occurrence percentages. Furthermore, results of this one-dimensional model were compared with the results of two-dimensional model (SRH-2D) for the evaluation of efficiency and precision of each applied model. Based on this comparison, computational process in two-dimensional model is longer and more complicated versus brief one-dimensional one. Although, two-dimensional models are more accurate than one-dimensional method, but according to existing modellers, delineation of probabilistic flooded areas based on Monte Carlo method is achievable via one-dimensional modeler. The applied software in this case study greatly responded to verify the research objectives. As a result, flood risk maps of the Richelieu River with the two applied models (1d, 2d) could elucidate the flood risk factors in hydrological, hydraulic, and managerial terms.

Keywords : flood modeling, HEC-RAS, model comparison, Monte Carlo simulation, probabilistic flooded area, SRH-2D, WMS

Conference Title : ICHEE 2019 : International Conference on Hydraulic and Environmental Engineering

Conference Location : Montreal, Canada

Conference Dates : May 23-24, 2019