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A Flash Flood Study on the Small Montaneous River Catchments in Western Romania

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The present study focuses on flash flood modeling on several mountaneous catchments situated in Western Romania by the use of two methodologies, when rainfall and catchment characteristics are known. Hence, the Soil Conservation Service (SCS) Method and the Rational Method will be employed for the generation of the 1%, 2% and 10% historical flash flood hydrographs on the basis of data spanning from 1989-2009. The SCS Method has been applied on the three gauged catchments in the study area: Petris, Troas and Monorostia making use of the existing interconnection between GIS and the rainfall-runoff models. The DEM, soil data and land use preprocessing in GIS allowed a determination of the hydrologic parameters needed for the rainfall-runoff model, with special emphasis on determining the time of concentration, Lag time and the weighted Curve Number according to Antecedent Moisture Conditions II, adapted for the Romanian territory. HEC-HMS rainfall-runoff model (Hydrologic Engineering Center- Hydrologic Modeling System) facilitates the historical 1%, 2% and 10% flash flood hydrograph generation for the three afore mentioned watersheds. The model is calibrated against measured streamflow data from the three existing gauging stations. The results show a good match between the resulted hydrographs and the observed hydrographs under the form of the Peak Weighted Error RMS values. The hydrographs generated by surface runoff on the ungauged catchments in the area is based on an automation of a workflow in GIS, built with ArcGIS Model Builder graphical interface, as a large part of the functions needed were available as ArcGIS tools. The several components of this model calculate: the runoff depth in mm, the runoff coefficient, the travel time and finally the discharge module which is an application of the rational method, allowing the discharge computation for every cell within the catchment. The result consists of discharges for each isochrones that will be subsequently interpolated in order to obtain the hydrograph of the historical flash floods. The two methodologies employed offer the hydrologist the opportunity of computing the historical hydrographs be it on a section of the river at choice, or for every affluent within the small river basins studied, the graphical data being easily accessed both in GIS and HEC-HMS. The peak discharge values of the main rivers as well as those of their tributaries are of great importance in establishing the hydrologic hazard under the form of floodplain maps that are inexistent for the studied watersheds.

Key words: flash flood modeling, ungauged catchments, GIS, HEC-HMS rainfall-runoff model.

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