

Flash Flood Warning System for Mountainous Region Based on Hydrogeomorphological Approach

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Due to the loss of life and damage to property, the flash flooding on mountain regions is considered on one of major natural disasters in the world recently. In this study, the development process of flash flood warning systems that is necessary to mitigate the flash flood hazard on mountain regions was introduced based on GIS technique and hydro-geomorphological approaches. The basis of this study is the computation of threshold runoff values, or the amount of effective rainfall that is necessary to cause the critical flow on small mountain basin. It is determined by equating the peak basin runoff, computed from the basin unit hydrograph of a given duration, to the stream flow at the basin outlet associated with flash flooding. A flooding flow is defined through the use of Manning's steady, uniform flow resistance formula. In this study, a catchment geometric characteristic is obtained from GIS and digital terrain elevation data and procedures of computing Horton's ratios. Therefore the decision of the flash flood warning trigger rainfall (FFWTR) is computed by the geomorphoclimatic unit hydrograph (GCUH). First, the peak basin runoff of the GCUH is set to equal with the critical flow from the Manning's formula. Then the effective rainfall is calculated by using the geomorphologic instantaneous unit hydrograph(GIUH) parameters and GIS products. Second, the total rainfall is estimated by using SCS CN method. Finally, the GCUH is decided by considering of the rainfall duration time and total rainfall at the given basin and rainfall event. In terms of warning criteria, the warning can be performed when the basin areal rainfall may be larger than the FFWTR estimated by the above process. This study provided the proper guidance of the FFWTR to the small scale mountain basin. And applied in several mountain basins

Keywords: Flash Flood Warning Trigger Rainfall; GIS; Critical Flow; Geomorphoclimatic Unit Hydrograph

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