Assessing the Urban Storm-Flood Disaster of Zhengzhou city Based on Fuzzy Methods

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The frequency of urban waterlogging floods increased year by year with the accelerating process of urbanization in China. It is very important for us to study the urban waterlogging warning and emergency management. Four flood evaluation indexes, which are the 3h cumulative rainfall, submergence and waterlogging disaster degree and comprehensive management efficiency, are selected as the accessing indexes based on the DPSIR (Driving forces, Pressure, State, Impact and Responses model) model. Fuzzy comprehensive evaluation method is applied to evaluate the urban disaster degree based on the index weight determined by the analytic hierarchy process (AHP). Zhengzhou city, which located in the middle of China, is taken as an example for our study. Based on the SWMM model, this paper divides the urban area of Zhengzhou into 2200 unit areas. Four grades were divided for disaster degrees. The results show that Zhengzhou city will encounter different grades of waterlogging disasters with different precipitation. 469, 708, 1006 and 1057 units area of the city will encounter the second grades for warning when the rain of half a year, one year, two years and five years return period happen. The results show that the method is scientific and reasonable and can be applied to practical work.

Keywords: waterlogging warning grade, DPSIR model, evaluation index, fuzzy comprehensive evaluation method