

A Study of Flooding Detention Space Efficiency in Different Lands Uses : The Case in Zhoushui River Downstream Catchment in Taiwan

Authors : Jie-Ying Wu, Kuo-Hao Weng, Jin-Cheng Fu

Abstract : This study proposes changes to land use for the purposes of water retention and runoff reduction, with the aim of reducing the frequency of flooding. This study uses the Zhoushui River in Taiwan as a case study, designing different land use planning strategies, and setting up various detention spaces. The HEC-HMS model developed by the Hydrology Research Center of the U.S. Army Corps of Engineers is used to calculate the decrease in runoff using various planning strategies, during five precipitation events of increasing return periods. This study finds that a maximum decrease in runoff of 14 million square meters can result by changing the form of land cover and storm detention in non-urban agricultural and river zones. This is due to the fact that non-urban land accounts for 96% of the area under study. Greatest efficacy was demonstrated in a two-year return period, with results ranging from 16% to 52%. The efficacy of a 100-year return period rated from 3% to 8%. Urban area detentions consist of agricultural paddy fields, storm water ponds and rainwater retention systems in building basements. Although urban areas can provide one million cubic meters of runoff storage, this result is insignificant due to the fact that urban area constitutes only 4% of the study area. By changing land cover, a 2-year return period has a 9% efficacy, and a 100-year return period has a 2% efficacy.

Keywords : flood detention space, land-use, spatial planning, Zhoushui River, Taiwan

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