

The Impact of Land Use Changes on Runoff of Taihu Lake Basin of China

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Land use/cover changes play a role of “interface” linking human activities and environmental systems. Land use changes alter the hydrological characteristics of the land surface, and have significant impacts on hydrological cycle and water balance, leading to increasing flood disaster. Taihu lake basin is fastest on urbanization among the regions in the east part of China. Impacted by cities’ fast expansion, the problem of storm flood disaster is very serious. In this study, land use information was extracted from 5-year’s TM/ETM images of 1985, 1995, 2000, 2005 and 2010. A grid-based distributed hydrological model was applied to estimate Runoff response to land use changes by simulating the monthly and annual runoff using long-term rainfall records from 1980 to 2010. Results showed that rapid changes in land use was noted in Taihu Lake catchment, which is characterized by conversion of agricultural land to construction land. The share of construction land increased from 9.7% to 13.4% in 15 years (1985-2000) with the increased area of 1388 km²; In the following 2000-2010, the share of construction land increased from 13.4% to 24.2% with the increased area of 4038 km². The land use changes during 1985-2000 resulted in an average increase of runoff by 4.37% in the whole Taihu Lake basin, approximately 6.46×10⁸m³. The land use changes during 1985-2010 led to an average increase of runoff by 12.82% in the whole basin, around 18.99×10⁸m³. Based on the analysis of rainfall variation in recent years in Taihu Lake basin, it is concluded that the increasing urban storm floods in Taihu Lake basin are closely related to the fast urbanization process.