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Examination of land use change effect on extreme hydrological events. A case study of Gialias basin in Cyprus.

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The effect of the abrupt urbanization on flood events is studied on Gialias basin in Cyprus. The Gialias watershed has been subject to flood events in recent years, due to the urbanization that took place within the basin. Satellite images of the years 2000 and 2010 were used to classify the land use within the basin and confirm the rapid urban development of the recent years. The land use map of 2000 was used in HEC-HMS hydrological model which was set up using the distributed modified Clark transform method (modClark) in a three sub basin setup. Four high flow events between 2000 and 2004 were used to calibrate and validate the rainfall runoff model. The Nash-Sutcliffe estimator was ranged between 0.877 and 0.432 among the calibration events and the three sub basins. For the validation event, it ranged between 0.57 and 0.655. The phase error ranged between -1 and 1 hour. Finally, the peak discharge error was kept under 15% in all sub basins and calibration events while for the validation event it ranged between -6% and 4%. The land use map of 2010 was then used to examine the effect of the land use on the past high flow events. The results indicate increase in the peak discharge, quicker response of the basin to the discharge process, and reduced infiltration. The increase in peak discharge was estimated at approximately 40%.