GIS Modeling of Impact of Forest Fire in Runoff Pattern in a Mediterranean Catchment

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SUMMARY

This study developed and used a partially distributed hydrological modeling system, to examine the effect of forest fire in a Mediterranean Catchment called 'Giscle' in Southern France. After GIS treatment in ArcGIS, a semi distributed hydrological model was set up for this purpose with the help of HEC HMS. Required parameters were either calculated or estimated and later calibrated for best fit in all situations. Precipitation and discharge data were available from 1975 to 2005 of which many instances were modeled and calibrated. Only two events were selected for analysis in this paper, representing heterogeneous conditions and their corresponding future scenarios were predicted acknowledging forest fire. Remote sensing was also used for estimating parameters for forest fire scenarios. It was found out that, after forest fire, the peak discharge increases by 10 % to 50%, highly depending on other factors, although the time of concentration and other over all pattern of flow didn't vary much. In some instances, a discharge rate was not observed to be in sync with the precipitation rate. The soil moisture conditions, amongst other factors, were looked upon as the possible cause. HEC HMS was found to produce better curve, in respect to the precedent rainfall of the event i.e. the software was found sensitive to the precedent precipitation of the event. This sometime produced a result almost different from the observed data. Also, there was a need to alter the Curve Number for wet and normal conditions, even after calibrating it. The project has valuable implications in predicting the flood as well as it has some rooms for future maneuvers. Correct estimations of parameters for achieving a curve very close to the observed data can be done. Also, the modeled can be further improved by acknowledging the effect of soil moisture conditions before the respected event.