



Quantifying the influence of artificial drainage on runoff generation in a an agricultural catchment by using WaSiM-ETH 7.9.11

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In recent years, the influence of artificial drainage on runoff generation has been investigated in several studies. Some of them show that especially in Germany agricultural drainage brings up rather flood supporting effects than flood mitigation. This prevalent opinion about drainage systems has to be proved by numbers in the catchment scale.

Between the sixties and nineties of the 20th century artificial drainage was very common in Bavaria to get more suitable areas for cultivation. Due to financial support programs and in the course of land consolidation many farmers inserted drainage systems into their fields, so that about 40 to 60 % of the agricultural areas are artificially drained now. The drainage measures are counteractive to natural water retention and could be a reason for increasing flood peaks. To proof this, the influence of drainage on runoff generation was quantified by the physically based rainfall runoff model WaSiM-ETH 7.9.11. The modeling was based on a flood retention concept in the agricultural Windach catchment area ($A_E = 123 \text{ km}^2$) with more than 50 percent of the cropland area drained.

The detailed information about the spatial distribution, the type, and the current state of the drainage systems was given by drainage maps, area-wide field surveys, and questioning of farmers. These properties are the input for WaSiM-ETH 7.9.11, which is able to consider artificial drainage by calculating it separately and adding it to the interflow. The model was calibrated and validated by hydrographs at different gauges and with results of irrigation experiments. The modeling of different scenarios shows,

that effects of drainage measures regarding runoff generation depend on (i) the different rainfall events and (ii) the catchment size.

In the presentation the modeling results will be shown and the question “Is it possible to mitigate flood events by rebuilding drainage systems especially in agricultural catchments?” will be answered. Furthermore, the limits and possibilities of using a physically based rainfall runoff model to describe drainage effects will be discussed.