Estimation of an Extreme Flood Scenario Induced by Heavy Precipitation, Following Wildfires for the North - Central California

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Abstract
Wildfires and extreme precipitation scenarios are an increasing trend in the global context. Elevated risks of floods are expected to occur due to fire-induced land cover alterations. Hence, it is important to identify the impact of wildfire upon extreme runoff scenarios, under changing climate. This study focuses on the impact of the 2018 Ranch fire and the possibility of downstream flood risk in the Lake County of North - Central California. The soil and water assessment tool (SWAT) is used to estimate potential extreme flood scenarios brought on by high precipitation after wildfires downstream of Lake County. Using hydrological and meteorological data from 2000-2018, the SWAT model is set up and calibrated on a daily and monthly basis. Model calibration was performed after identifying 9 sensitive parameters, including the soil conservation service curve number (SCN-CN), and the model for pre-fire conditions agreed well with R^2=0.83, NSE=0.81, and PBIAS=-17.8 values. The soil conservation service (SCS) curve number, wildfire burn severity, and land use are considered in determining the variation of discharge under the post-fire condition. Further research can be used to identify probable flood scenarios even in the context of post-fire low precipitation levels and to enhance simulation outcomes under various parameter modifications.

Keywords: Hydrology, Flood risk assessment, Post-fire runoff, SWAT hydrological model, Wildfire