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Hydrological and sedimentation implications of landscape changes in a Himalayan catchment due to bioenergy cropping

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There is a global effort to focus on the development of bioenergy and energy cropping, due to the generally increasing demand for crude oil, high oil price volatility and climate change mitigation challenges. Second generation energy cropping is expected to increase greatly in India as the Government of India has recently approved a national policy of 20 % biofuel blending by 2017; furthermore, the country's biomass based power generation potential is estimated as around ∼24GW and large investments are expected in coming years to increase installed capacity. In this study, we have modelled the environmental influences (e.g.: hydrology and sediment) of scenarios of increased biodiesel cropping (Jatropha curcas) using the Soil and Water Assessment Tool (SWAT) in a northern Indian river basin. SWAT has been applied to the River Beas basin, using daily Tropical Rainfall Measuring Mission (TRMM) precipitation and NCEP Climate Forecast System Reanalysis (CFSR) meteorological data to simulate the river regime and crop yields. We have applied Sequential Uncertainty Fitting Ver. 2 (SUFI-2) to quantify the parameter uncertainty of the stream [U+FB02]ow modelling. The model evaluation statistics for daily river flows at the Jwalamukhi and Pong gauges show good agreement with measured flows (Nash Sutcliffe efficiency of 0.70 and PBIAS of 7.54 %). The study has applied two land use change scenarios of (1) increased bioenergy cropping in marginal (grazing) lands in the lower and middle regions of catchment (2) increased bioenergy cropping in low yielding areas of row crops in the lower and middle regions of the catchment. The presentation will describe the improved understanding of the hydrological, erosion and sediment delivery and food production impacts arising from the introduction of a new cropping variety to a marginal area; and illustrate the potential prospects of bioenergy production in Himalayan valleys.



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