Impacts of land use and climate changes on the optimal selection of best management practices in agricultural areas

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Nonpoint source pollutions from agricultural lands may cause the degradation of water quality due to sediment and nutrients. Best management practices (BMPs) have been extensively applied to control and reduce the movement of agricultural nonpoint sources into the water body. However, widespread application of BMPs can be cost prohibitive and redundant in pollution control. Thus, it is important to select the most cost effective BMPs scenarios. Furthermore, it has been widely recognized that land use and climate changes in the future will have significant impact on water quality of the watershed, which can result in the change in optimal measure and location of BMPs. Therefore, it is necessary to consider the land use and climate changes in selecting the suitable BMPs. The objective of this study was to assess the impacts of land use and climate changes on optimal selection and placement of BMPs.

In this study, the Soil and Water Assessment Tool (SWAT) model was applied to evaluate the water quality effects of BMPs. The SWAT model was calibrated and validated using stream flow and water quality data obtained from stations. Model calibration and validation performances will be evaluated using coefficient of determination (R^2), Nash-Sutcliffe efficiency (E), root and mean square error (RMSE). The calibrated SWAT model will be applied with various land use change scenarios as well as climate change scenarios generated by using the LARS-WG stochastic weather generator. These results of this study will evaluate the effect of land use and climate changes on optimal selection and placement of BMPs.

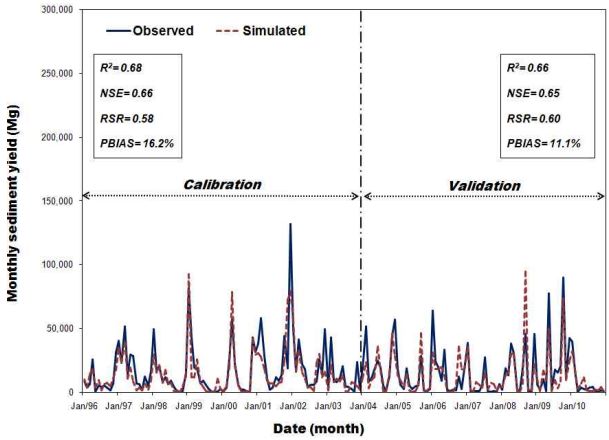

Figure 1. Results of calibration and validation for streamflow

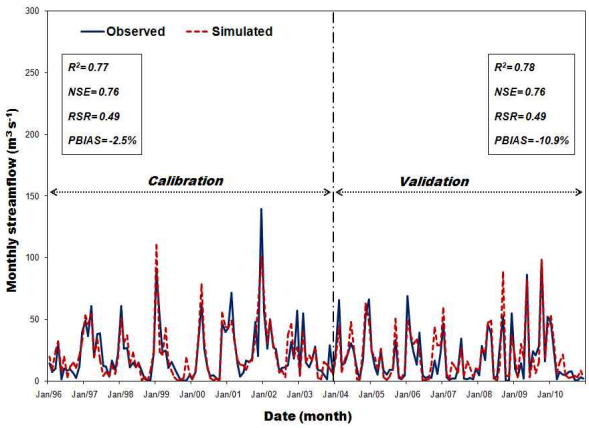

Figure 2. Results of calibration and validation for streamflow

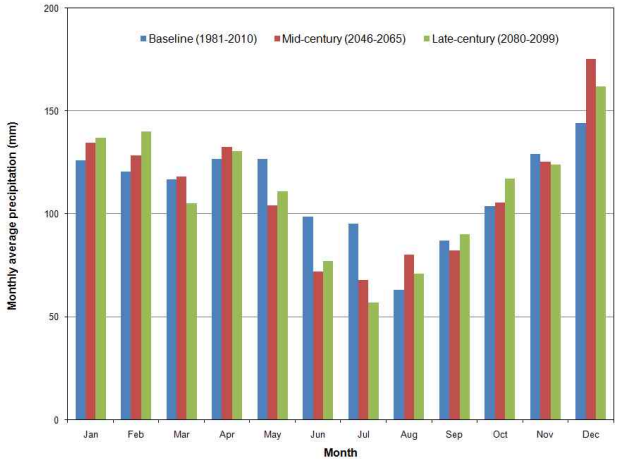

Figure 3. Monthly average precipitation with various scenarios

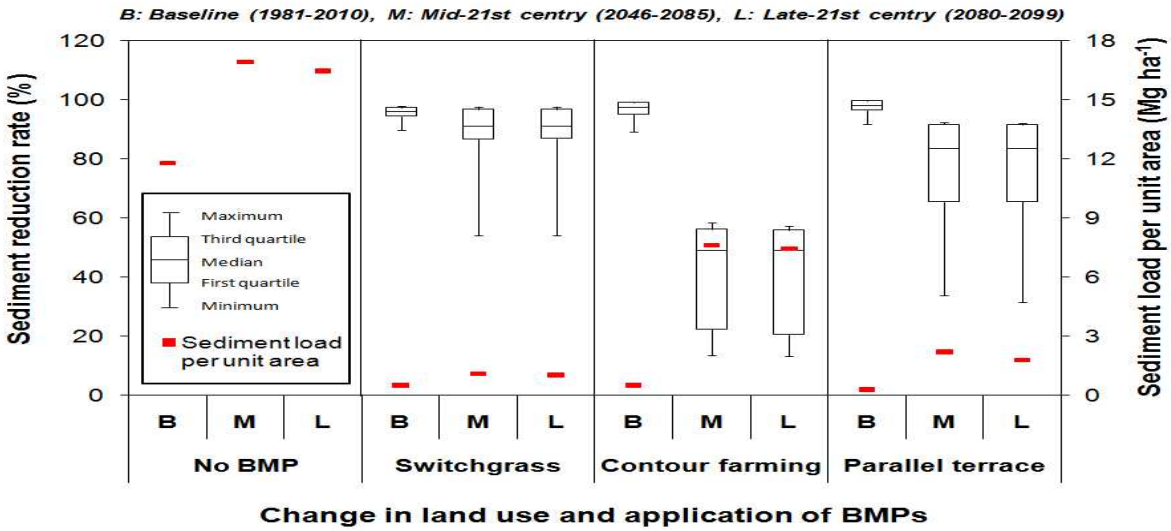

Figure 4. Impacts of climate change on the efficiency of mitigation strategies