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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Reduction Assessment of Agricultural Non-Point Source Pollutant Loading" *by* YiCheng Fu et al.

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Dear editors, We would like to submit the enclosed manuscript entitled "Reduction Assessment of Agricultural Non-Point Source Pollutant Loading" (No.: hess-2017-755), which we wish to be considered for publication in "Hydrology and Earth System Sciences" (HESS). No conflict of interest exits in the submission of this manuscript, and manuscript is approved by all authors for publication. We would like to declare on behalf of my co-authors that the work described was original research that has not been published previously, and not under consideration for publication elsewhere, in whole or in part. All the authors listed have approved the manuscript that is enclosed. In this work, we evaluated the manuscript is a part of our present research achievement, and which is a good paper. I hope this paper is suitable for "Hydrology and Earth System

Sciences (HESS)". We submitted our manuscript "Reduction Assessment of Agricultural Non-Point Source Pollutant Loading", Reference hess-2017-716 to "Hydrology and Earth System Sciences" on 6th Dec., 2017. Non-point source (NPS) pollution has become the largest threat to water quality, in recent years. With the development of technology, application of models to control NPS pollution has become a very common practice for the management of soil and water resources on watershed scale in China. The Soil and Water Assessment Tool (SWAT) is a semi-distributed model, that was primarily developed to estimate the impacts of various land use and management practices on water, sediment, and agricultural chemical yields on water quantity and water quality in complex watersheds. Based on the overview of published papers with application of SWAT, the study topics is mainly focus on nutrients, sediments and related BMPs, impoundment and wetlands, hydrologic characteristics, climate change impact, and land-use change impacts. A SWAT model was constructed based on rainfall runoff and land use type. The migration-transformation processes of agricultural NPS pollutants were simulated and calculated based on the SWAT model. Besides, the loadings and distribution traits of NPS pollutants were also systematically analyzed based on the model. The model was used to quantify the spatial loading intensities of NPS Nutrient (Total nitrogen-TN and Total phosphorus-TP) to Huntai River Watershed (HTRW, Liaoning province, China) under two scenarios (without and with buffer zones). The SWAT model was calibrated and validated using actual monitoring data as well as the physical properties of the underlying substrate, hydrology, meteorology and pollutant sources in the HTRW. Scenario settings are mainly based on the changes of surface runoff and sediments, climate and land-use change from different spatial scales, and climatic/physiographic zones. About 1 km within both banks of the trunk streams of the Huntai, Taizi and Daliao rivers, and 5 km surrounding the reservoirs were defined as buffer zones. Existing land use type within the buffer zone was changed to reflect the natural environment. The output of pollutant production under the "environmental protection" scenarios (EPS) was calculated based on the status quo scenario. Under the status quo scenario, the annual mean modulus of soil erosion in the HTRW was 811

kg/ha, and the output intensities of TN and TP were 19 and 7 kg/ha, respectively. For the unit area, the maximal loading intensities for TN and TP were 365.36 and 259.83 kg/ha, respectively. In terms of spatial distribution, TN and TP loading varied substantially. Under the EPS, the magnitude of the nitrogen and phosphorus losses from cultivated land decreased to a certain degree, and the TN and TP pollution loading per unit area were reduced by 5 and 1 kg/ha annually, respectively. In comparison, the quantity of NPS pollutant production under the EPS was reduced by 21.9% compared with the status quo scenario, and the quantities of TP and TN decreased by 10.4% and 25.9%, respectively. These changes suggested a clear reduction in the export loading of agricultural NPS pollution. Loading intensities analysis showed that land use type is one key factor for controlling NPS pollution. The NPS pollution loading decreased under the EPS, which showed that environmental protection measure could effectively cut down NPS pollution loading in HTRW. SWAT was used to assess the reduction of agricultural NPS pollutant. However, SWAT model requires a large amount of data about the watershed being modeled; the data inaccuracy and local factors would impact the accuracy of the SWAT model. Further research is required to recognize the main factors that affect the accuracy of different NPS pollutants loading, examine uncertainty of sensitivity parameters, and extend the potential application range of SWAT in China. And the Highlights of the paper were, âĂć SWAT was used to assess the reduction of agricultural NPS pollutant. âĂć Buffer zone of land use type could reflect the natural environment. âĂć 21.9% pollutant reduction under the EPS. SWAT model was simulated and calculated migration-transformation processes of agricultural NPS pollutants. Existing land use type within the buffer zone was changed to reflect the natural environment. The quantity of NPS pollutant production under the EPS was reduced by 21.9% compared with the status quo scenario. SWAT model requires a large amount of data about the watershed being modeled. We hope you are interested in the research content of this article and can handle this article. As the corresponding author of the paper, I would greatly appreciate if you could inform me of anything about it. On behalf of my co-authors, we would like to express our great appreciation to you.

We wish you a happy work. Thank you very much for your time and consideration. If you have any further questions, please do not hesitate to contact me.

Yours sincerely, Yicheng Fu(corresponding author), Wenbin Zang, Jian Zhang, Hongtao Wang, Chunling Zhang, & Wanli Shi E-mail address of corresponding author: swfyc@126.com (Y.C. Fu).

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Please also note the supplement to this comment:
https://www.hydrol-earth-syst-sci-discuss.net/hess-2017-755/hess-2017-755-AC1-supplement.pdf

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