

Assessment of watershed scale nitrogen cycling by hydrochemical modeling

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Nitrogen cycling in terrestrial areas is affecting water quality and ecosystem of aquatic area such as lakes and oceans through rivers. Owing to the intensive researches on nitrogen cycling in each different type of ecosystem, we acquired rich knowledge on nitrogen cycling of each ecosystem. On the other hand, since watershed are composed of many different kinds of ecosystems, nitrogen cycling in a watershed as a complex of these ecosystems is not well quantified. Thus, comprehensive understanding of nitrogen cycling of watersheds by modelling efforts are required. In this study, we attempted to construct hydrochemical model of the Ise Bay watershed to reproduce discharge, TN, and NO₃ concentration. The model is based on SWAT (Soil and Water Assessment Tools) model. As anthropogenic impacts related to both hydrological cycling and nitrogen cycling, agricultural water intake/drainage, and domestic water intake/drainage were considered. In addition, fertilizer input to agricultural lands were also considered. Calibration period and validation period are 2004-2006, and 2007-2009, respectively. As a result of calibration using 2000 times LCS (Latin Cubic Sampling) method, discharge of rivers were reproduced fairly well with NS of 0.6-0.8. In contrast, the calibration result of TN and NO₃ concentration tended to show overestimate values in spite of considering parameter uncertainties. This implies that unimplemented denitrification processes in the model. Through exploring the results, it is indicated that riparian areas, and agricultural drainages might be important spots for denitrification.

Keywords: SWAT, denitrification