Geophysical Research Abstracts
Vol. 12, EGU2010-14788, 2010
EGU General Assembly 2010

Farmland Runoff of Nitrogen and Phosphorus in Songhuajiang Watershed

Ruixia Yuan (1), Zhaohui Wang (1), Xinshan Song (1), Jianshe Liu (1), and Jianwei Dong (2)

(1) College of Environmental Science and Engineering, Donghua University, Shanghai, 201620, China, (2) Jilin Hydraulic Research Institute, Changchun, Jilin province, 130022, China

Abstract: Qianguo Irrigation District is typical soda saline-alkaline land of Songhuajiang Watershed, where the excess irrigation for leaching Na+ from the root zone has aggravated the non-point source pollution (NPS) from agricultural system and therefore threatened the water quality of Chagan Lake, a national nature reserve. A field experiment with independent irrigation system was conducted to elucidate the dynamic characteristics of nitrogen (N) and phosphorus (P) in surface water of paddy field under different hydrotechnic conditions and their potential environmental impact in 2009. The results showed that split N fertilizer application with four times and single basal application of P fertilizer greatly increased the concentration of nitrate nitrogen (NO3–N), total nitrogen (TN), soluble phosphorus (SP) and total phosphorus in surface water, and then subsequently declined. During all the experimental period, the concentration of N and P in paddy field runoff in the investigated area were TN 1.08∼3.90 mg/L, TP 1.32∼3.87 mg/L respectively, higher than the surface water quality criteria of Class III and Class V in China, therefore N and P losses from paddy soils during each drainage were contributing to downstream water eutrophication. N and P in runoff mainly consist of particulate phosphorus (PP) and NO3–N, respectively. During rainfall or paddy growth period, the concentration of N and P in the runoff tended to temporal decrease, but showed great fluctuation during irrigation and heavy rainfall. Pollution load of the experimental plot showed that either N and P loss amount or the variation coefficient of TN and TP concentration in drainage was significantly positively correlated with the hydrotechnic conditions. N and P runoff from paddy field directly affected the eutrophication level of offtakes and hence deteriorated the downstream aquatic environment. The ammonia concentration of the return water from farmland was rather high, thus threatening the fish farming in the downstream Chagan Lake. The period within a week after the fertilizer application, irrigation or heavy rainfall days was very critical to control N and P loss; the fields with good irrigation condition should be regarded as the critical source areas (CSA) to monitor due to their susceptivity to agricultural stream disturbance.

Keywords: soda saline-alkaline land; nitrogen; phosphorus; non-point source pollution; Songhuajiang watershed

Acknowledgement
Project supported by National Water Pollution Control and Management Science & Technology Specific Projects of China (No.2008ZX07207-006-04).