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Sonoko D. KIMURA[1 *2], Xiaoyuan YAN[2], Ryusuke HATANO[3], Atsushi HAYAKAWA[4], Kazunori KOHYAMA[5], Chaopu TI[2], Meihua DENG[1], Masayuki HOJITO[6], Sunao ITAHASHI[5], Kanta KURAMOCHI[3], Zucong CAI[2] and Masanori SAITO[7]

[1]Tokyo University of Agriculture and Technology, Tokyo (Japan)
[2]Institute of Soil Science, Chinese Academy of Sciences, Nanjing, 210008 (China)
[3]Hokkaido University, Sapporo (Japan)
[4]Akita Prefectural University, Akita (Japan)
[5]National Institute for Agro-Environmental Sciences, Tsukuba (Japan)
[6]National Institute of Livestock and Grassland Science, Nasushiohara (Japan)
[7]Tohoku University, Osaki (Japan)

To analyze the effect of agricultural activity on nitrogen (N) budget at watershed scale, a watershed-scale analysis was conducted at two Japanese and one Chinese watersheds. The study sites are the Shibetsu River watershed (SRW) and Upper-Naka River watershed (UNRW) in Japan, and the Jurong Reservoir watershed (JRW) in China. The total area and the proportion of agricultural area (in brackets) of the watershed was 685 km^2 (51%), 1299 km^2 (21%) and 46 km^2 (55%) for SRW, UNRW and JRW, respectively. The main agricultural land use in SRW was forage grass, while paddy rice fields occupied the highest proportion in UNRW and JRW with values of 11% and 31% of total land area, respectively. The farmland surplus N was 61, 48 and 205 kg N ha-1 yr-1 for SRW, UNRW and JRW, respectively. The total input and output for the whole watershed was 89 and 76, 83 and 61, and 353 and 176 kg N ha^{-1} yr^{-1} for SRW, UNRW and JRW, respectively. The proportion of discharged N to net anthropogenic N inputs was 31%, 37% and 1.7% for SRW, UNRW and JRW, respectively. The two watersheds in Japan showed similar relation to the previous reports, while the JRW showed a totally different characteristic compared to the proceeding studies. The high proportion of paddy rice fields and the water bodies in the landscape was an underestimated N sink in this area.

Spatio-temporal variation of riverine N and P concentration in the Lake Hachiro watershed

A. HAYAKAWA, N. KATANO, Y. ISHIKAWA and S. HIDAKA

Department of Biological Environment, Faculty of Bioresource Sciences, Akita Prefectural University

Water quality in the Lake Hachiro is degraded as a result of nutrient pollution such as N and P, which can cause harmful algal bloom during summer. The relative availability of N and P in an lake water determines which nutrient is more limiting: P tends to be limiting for algal bloom when the N:P is over the Redfield ratio of 16:1 (moler). The balance of N and P delivering from rivers to the lake, therefore, can control algal bloom. This study evaluated a spatio-temporal variation of riverine N and P concentration in the Lake Hachiro watershed. River water sampling was conducted at 28 points in the BBM river catchment and at 20 points in the MTN river catchment once a month in 2008. Lake water sampling was also conducted once at 45 points in August 2010 (Hayakawa et al., 2011). The temporal variation of riverine DIN and DIP concentrations showed a reverse trend. During summer, NO_3-N concentration decreased while PO_4-P concentration increased, resulting the decrease of DIN: