

Two-track approach for establishing groundwater quality management schemes in agricultural areas: field- and catchment-scale experiments

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Agricultural activities with excessive fertilization rates are common in many countries, causing accumulation of nutrients in soil, nitrate contamination of groundwater, and eutrophication of surface water. This study is aimed to suggest the sustainable fertilization rate for farmers and to develop a model assessing the nitrate concentration level of water bodies. For this purpose, we designed two experiments: 1) the field-scale experiment to figure out how much fertilizer cannot pollute groundwater while maintaining the crop harvesting efficiency and 2) the catchment-scale experiment to reveal the relationships between nitrogen budget and nitrate concentration in groundwater and surface water. In field tests, we are tried to find out how the plant (*Zea Mays*) N uptake and nitrate leaching vary with soil textures under the same nitrogen fertilization conditions. Nitrate concentration of soil water is monitored by multi-level lysimeters, and the growth and the yield of the crop are measured after the growing season. In the catchment-scale experiment, we are tried to calculate the amount of nitrate leaching under the yearly nitrogen surplus (i.e., N input minus N output) condition and then the result is compared to the actual nitrate concentration change in shallow groundwater. However, we should note that long-term monitoring is needed because it takes time for the N surplus to reach the groundwater table to affect the groundwater quality. In this presentation, we will introduce the framework and purpose of an ongoing 5-year research project in South Korea to examine sustainable fertilization practices to minimize groundwater contamination but to maintain crop growth.

<Acknowledgement> This study was supported by the project from National Institute of Environmental Research (NIER), Korea.