

## **Long term continuous field survey to assess nutrient emission impact from irrigated paddy field into river catchment**

Kanami Kogure (1), Masaatsu Aichi (2), and Matthias Zessner (3)

(1) FUSO Corporation, Department of Technology Management, Tokyo, Japan (kanamikogure@gmail.com), (2) Department of Environment Systems, Graduate School of Frontier Sciences, The University of Tokyo, Japan, (3) Institute for Water Quality, Resources and Waste Management, TU Wien, Vienna, Austria

In order to achieve good river environment, it is very important to understand and to control nutrient behavior such as Nitrogen and Phosphorus. As we could reduce impact from urban and industrial activities by wastewater treatment, pollution from point sources are likely to be controlled. Besides them, nutrient emission from agricultural activity is dominant pollution source into the river system. In many countries in Asia and Africa, rice is widely cultivated and paddy field covers large areas. In Japan 54% of its arable land is occupied with irrigated paddy field. While paddy field can deteriorate river water quality due to fertilization, it is also suggested that paddy field can purify water.

We carried out field survey in middle reach of the Tone River Basin with focus on a paddy field IM. The objectives of the research are 1) understanding of water and nutrient balance in paddy field, 2) data collection for assessing nutrient emission. Field survey was conducted from June 2015 to October 2016 covering two flooding seasons in summer.

In our measurement, all input and output were measured regarding water, N and P to quantify water and nutrient balance in the paddy field. By measuring water quality and flow rate of inflow, outflow, infiltrating water, ground water and flooding water, we tried to quantitatively understand water, N and P cycle in a paddy field including seasonal trends, and changes accompanied with rainy events and agricultural activities like fertilization.

Concerning water balance, infiltration rate was estimated by following equation.

$$\text{Infiltration} = \text{Irrigation water} + \text{Precipitation} - \text{Evapotranspiration} - \text{Outflow}$$

We estimated mean daily water balance during flooding season. Infiltration is 11.9mm/day in our estimation for summer in 2015. Daily water reduction depth (WRD) is sum of Evapotranspiration and Infiltration. WRD is 21.5mm/day in IM and agrees with average value in previous research.

Regarding nutrient balance, we estimated an annual N and P balance. N and P surplus are calculated by difference between input and output in a paddy field. As to nutrient balance in 2015 surplus shows minus value between input as fertilizer and output as rice product. However, by taking account of input via irrigation water as nutrient source, N and P input and output balance with errors by 9% and 14%. Results of long term continuous survey suggest that irrigation water is one of nutrient sources in rice cultivation.