

Hydrological controls on phosphorus export from diffuse source in Lake Biwa basin, central Japan.

*Ken'ichi Osaka¹, Haruto Tanabe¹, Takaaki Ishibashi², Syuhei Ban¹

1. Department of ecosystem study, University of Shiga Prefecture, 2. Graduate school of Environmental Science

Phosphorus is an important nutrient for ecosystems, and its availability is linked to widespread environmental problems, such as eutrophication, hypoxia, and the expansion of harmful algae in aquatic ecosystems (Schindler 1974, 2008; Jones and Bachmann 1976; Correll 1998; Downing et al. 2001). Traditionally, agricultural land has been recognized as major diffuse source of phosphorus exported from watershed (Sims et al., 1998; Brett et al., 2005; Mockler et al., 2017 Sharpley et al., 2008, Schoumans et al., 2014), in recent years, forested watershed has also been recognized as potentially important diffuse source of phosphorus (Ice and Binkley, 2003; Ide et al. 2007, 2008; Loehle et al., 2014).

Many studies tracing phosphorus source from the watersheds have observed the relation between phosphorus export and land use type of watershed, however, these studies were conducted usually in base flow. On the other hand, it have been reported that phosphorus mainly exported during rainfall events from watersheds (Inoue and Ebise 1991; Evans and Johnes, 2004; Ide et al. 2012). Therefor we observed the relation between phosphorus concentrations and land use type of watershed in the different hydrological condition, in order to clarify the contribution of phosphorus export from different land use type watershed.

We collected the river water samples from 20 watersheds in Lake Biwa basin from March 2019. The water samples were collected at once in a month during different hydrological condition (24 hours cumulative rainfall were 0-97mm). The watersheds consist of several land use: agricultural land, forest, and residential area. We measured total phosphorus (TP), dissolved phosphorus (DP) concentrations with molybdenum blue method, phosphate (PO_4^{3-}) concentrations with ion chromatography. Particulate phosphorus concentrations were calculated as difference between TP and DP.

The averaged TP concentrations in 20 rivers varied largely, ranging from 0.14 to 0.86 mg/L. In base flow condition, the averaged PO_4^{3-} , PP and TP were higher with the increase of part of agricultural land in watershed. In flooded condition, averaged PO_4^{3-} concentrations were also higher with the increase of part of agricultural land in watershed, however, TP and PP concentrations did not relate with part of agricultural land in watershed. In presentation, we will discuss the TP and PP export processes in flooded condition.

Keywords: phosphorus, watershed, rainfall event