

## Estimation of phosphorus budget in coastal lake using mass balance model and sediment core profile data

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In order to understand the processes of phosphorus retention and export in a eutrophic coastal artificial lake in western Japan, we estimated the phosphorus budget by the sediment nutrient data and a mass balance model approach from 1980 to 2008. The phosphorus flux from inflowing rivers is highest in summer period from June to August which contributes the 43% of annual average P input and is lowest at 9% in winter period from December to February. The phosphorus retentions determined by mass balance calculations were lower than those calculated from sediment total phosphorus concentrations and sediment accumulation rates. The mass balance results show around 400 tons of phosphorus was trapped in the lake from 1980 to 2008. Meanwhile the sediment core data shows the accumulation is about 3 times higher than that. It suggests that phosphorus release from sediment which was affected by the severe lake eutrophication in the 1970s contributed to the recent phosphorus cycle in the lake. The mass balance results suggest the phosphorus is trapped in the lake in all seasons except winter. The dominant period is in spring from March to May, which contributes an average of 57% of the annual average trapped phosphorus. The annual phosphorus trapped in lake calculated by the mass balance model has been decreasing from around 15 g m<sup>-2</sup> year<sup>-1</sup> in 1980 to around 0 in 2008. This result shows the decreasing trend of the nutrient flux into the lake, especially after the 1990s. However, core profile result shows a slightly increasing trend with variations up to 6 g m<sup>-2</sup> year<sup>-1</sup> in 2008. These different trends suggested the recovery of hyper eutrophication and high level of phosphorus recycle in lake is still continuing.