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Typhoon effects on phosphorus dynamics in a subtropical reservoir

Ming Fai Chow

Research Center for Environmental Changes (RCEC), Academia Sinica, 128 Academia Road, Section 2, Nankang, Taipei, 115, Taiwan (mingfai1983@yahoo.com)

Intense storm event during typhoon period is identified that will significantly alter the content of phosphorus in the water body of reservoir. However, the fate and transport of phosphorus in aquatic environments that triggered by typhoons is poorly understanded. Better understanding of typhoon impacts on the runoff mechanism of phosphorus will be useful in improving the management of water pollution and reduce the impairment to the drinking water sources. In this study, three typhoon events namely Talim, Saola and Tembin which occurred in between June and August 2012 were investigated through continuous sampling (every 3 hours) at five main tributaries at the upstream of Fei-Tsui reservoir, Taiwan. In addition, weekly sampling was conducted at different depths throughout the water column at the dam site. For all water samples, in situ measurements of pH, temperature, electrical conductivity (EC) and dissolved oxygen (DO) were conducted. The water samples had been analysed for total suspended solid (TSS), dissolved inorganic phosphorus (DIP), dissolved organic phosphorus (DOP), particulate phosphorus (PP) and total phosphorus (TP). Results indicated that high intense typhoon storm had caused a 2-10 times increase in DIP compared with the moderate storm and base flow condition. Correlation analysis showed that TP was positively correlated with TSS. That indicates the turbidity current can be a source of phosphorus. All nutrients showed a contrasting hysteresis pattern, which reflecting different supply of source and transport mechanism. PP was mainly originated from overland surface runoff and resuspension of sediment from the river bottom, while DIP was supplied from both surface and subsurface flow. High PP concentration was observed during the early part of storm runoff at the upstream river. Results suggested that first flush effect was evident for PP. These findings had improved the understanding on fate and transport of phosphorus in the reservoir watershed during the typhoon induced storm events.