Wet weather discharge characteristics of phosphorus and management implications in a mixed land-use watershed


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ABSTRACT

The diffuse phosphorus (P) load to receiving waters has been of great concern because it is considered the main cause of eutrophication and algal bloom in natural waters. For establishing effective P control strategy, it is the important first step to obtain information on characteristics of diffuse source of P and its discharge behavior during storm events. In this study, wet and dry sampling collection were performed to measure concentrations of P in different types (particulate, dissolved, and soluble reactive P for waters and adsorbed, non-apatite, apatite, and residual P for soil/sediment) in storm water runoff and soil/sediment on the catchment surface from different land uses. The results showed that urban land uses can be the most significant contributor to diffuse P loading because of the high concentration of P in the storm water run-off. Despite minimal wet discharge concentration of P observed, agricultural land-use can be a potentially important P source due to the relatively greater P content in agricultural soil. In addition, it was found that forest land use may discharge significant amount of P during storms unless soil erosion is properly controlled particularly in a large-scale storm. The results also suggested useful P management implications for different land uses. That is, urban site showed a strong first flush phenomenon, implying that first flush enhanced control should be a cost-effective strategy. Agricultural site revealed seasonal first flush of P, suggesting that management actions can be focused more on earlier season that has greater P discharge concentration. In addition, controlling fine particles should be very important because smaller particles contain greater amount of readily bioavailable P.

Keywords: Land use; Non-point source pollution; Phosphorus; Storm water quality assessment

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