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Title

Concentration-discharge relationships observed for sediment and phosphorus transport in response to storm events in an agriculturally dominated watershed in central Illinois

Abstract

Increased sediment introduction and transport in streams negatively impact reservoir quality, water quality, and ecological diversity. Deleterious effects include reservoir filling, water pollution, changes in vegetation density, disruption of food chain, channel navigability, and ecological impairment. The mobilization and introduction of sediments typically takes place during storm events. Phosphorus can adsorb onto sediments leading to elevated transport and introduction in streams. Increased phosphorus introduction into waterways is one of the drivers of algal blooms and hypoxic conditions in waterways such as the dead zone that forms annually in the Gulf of Mexico. The goal of this study is to show that suspended sediment and phosphorus exhibit similar transport mechanics in the Six Mile Creek watershed. Analysis of concentration-discharge relationships were conducted to identify hysteresis patterns and assess transport mechanics and the relationship between suspended sediment and phosphorus in the Six Mile Creek watershed. Three years of storm data for Six Mile Creek, which is part of the Evergreen Lake watershed located in McLean County Illinois, were examined. Preliminary analysis of the data and of the hysteresis patterns indicated that the suspended sediment and phosphorus respond in similar behaviors. Simultaneous evaluation of hysteresis patterns provides an effective and valuable tool for assessing the relationship between storm events and the response of suspended sediment and phosphorus. This relationship can be used to infer both sediment and phosphorus transport dynamics in the stream on an annual, seasonal, or event-based scale. A further understanding of suspended sediment and phosphorus transport mechanics and introduction can be utilized by farmers and agricultural managers to develop more sustainable land management practices and ultimately mitigate the amount of suspended sediments and phosphorus introduced into surface waters.