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DETERMINING THE EFFECTIVE WIDTH OF RIPARIAN BUFFERS IN KOREAN WATERSHEDS USING THE SWAT MODEL

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Abstract

Riparian buffers play an important role in improving water quality, providing wildlife habitat, and reducing suspended sediments and pollutants entering the water body. The efficiency of pollutant reduction by a riparian buffer is greatly influenced by the width of the riparian buffer. In this study, the Soil and Water Assessment Tool (SWAT) model was applied to the Yudeung Stream watershed, Daejeon Stream watershed, and Gap Stream watershed to determine the most effective width of the riparian buffer. These three largest streams in the Daejeon metropolitan area in South Korea were selected to evaluate the effects on nutrient reduction of various riparian buffer widths ranging from 15 to 1,000 m. The decision criterion for the optimum size of the riparian buffer was a 10% reduction in nutrient load based on the water pollution management plan for Daejeon. Total nitrogen and total phosphorus were reduced by 10% with an 80m deciduous riparian buffer and a 70-m evergreen riparian buffer in the Yudeung Stream watershed. Also, this diminishing was also done with a 70m deciduous and 60m evergreen buffer in the Daejeon Stream watershed, and by 9.8% and 16.3% with a 300m deciduous buffer in the Gap Stream watershed, while a 100m evergreen buffer was needed for 10% reduction. Thus, the effects of riparian buffers on flow and nutrient reduction depend on the type of trees and the width of the buffer, as well as the location of the urban area and land uses in the watershed. These results may be useful in developing economical watershed-specific riparian buffer management practices.

Key words: riparian buffer, South Korea, SWAT, total nitrogen, total phosphorus

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