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OPTIMAL CONTROL OF NONPOINT SOURCE POLLUTION IN BAHE RIVER BASIN, NORTHWEST CHINA, BASED ON SWAT MODEL

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Abstract

This paper deals with the study of landscape pattern and nonpoint source (NPS) pollution process in Bahe River Basin using Spearman correlation analysis and Redundancy Analyses (RDA) by simulating SWAT model. On this basis, different scenarios are set up in the critical source area. Results show that the landscape pattern of the Bahe River Basin is closely related to the NPS pollution process. The pollutant load is affected by the degree of fragmentation, aggregation and complexity of landscape. Farmland is the main source of pollution, whereas forest land and grassland inhibit the pollutant output. Simulation results of the scenarios show that the reduction effect of forest land on pollution load is considerably better than that of grassland. The larger the area of returning farmland to forest land (or grass land) is, the smaller the patch density is, and the greater the aggregation index is, the better the control effect on NPS pollution is. Among all the scenarios, the control effect of the measures of returning farmland to forest land in slopes above 15° is the best, and the reduction rate of total phosphorus and total nitrogen has reached about 25%. The research provides a certain theoretical basis for the management and control of NPS in other similar basins. However, in the actual project, the factors such as control capacity and cost should be comprehensively considered in order to find the best management measures.

Keywords: Bahe River Basin, landscape pattern, NPS pollution, optimized control, SWAT model

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