Development and Application of a Distributed Source Pollutant Transport Model Based on BTOPMC

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Agricultural non-point and industrial point sources are contributing nitrogen and phosphorus concentrations in Chinese catchments and these pollutants cause degradation of river water quality for a long distances. To evaluate these impacts, a distributed pollutant transport model was developed on the basis of BTOPMC (Block-Wise Use of TOPMODEL with Muskingum-Cunge Method), a grid-based distributed hydrological model. In this model, the water flow routing process of BTOPMC is the carrier of pollutant transport and these pollutants are washed off with a direct runoff. Pollutant flux for each grid is simulated based on mass balance of pollutants within the grid and pollutant transmission occurs between grids in the direction of the water flow on daily time steps. The model was tested in the study area of the Lu county area situated in the Laixi river basin in the Sichuan province of southwest China. The simulated concentrations of nitrogen and phosphorus are compared with the available monthly data at several water quality stations. These results demonstrate a greater pollutant concentration in the beginning of high flow period indicating the main mechanism of pollution transport. From these preliminary results, we suggest that the distributed pollutant transport model can reflect the characteristics of the pollutant transport and reach the expected target.

Keywords: Pollutant transport, BTOPMC, Distributed hydrological model, Muskingum-Cunge Method, Modeling