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Optimization and Sensitivity Analysis of the Effective Parameters in Sediment Yield Based on SUFI2 Algorithm (Case study: Doiraj River Basin, Iran)

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Abstract

Erosion and sedimentation as a river natural behavior lead to the loss of soil and cause irreparable damages to water development projects. Since the phenomenon of erosion and deposition is one of the most complex natural processes, the complete understanding of the effective factors involved in this phenomenon is really a big problem. This study was done to optimize the parameters affecting sediment yield and determine their sensitivity in the Doiraj river basin in the West of Iran, using SWAT, a semi-distributed model, and SUFI2 algorithm, and the monthly sediment yield from 1994 to 2004. In the first run of the model, coefficients R^2, NS, and Br^2 were respectively obtained as 0.43, 0.39 and 0.28. The results showed that performance of the model with the default data was not satisfactory and we needed to determine the used optimal values. Then, the optimal values of parameters were determined using SUFI2 algorithm and reverse modeling and the model was run with the new values. Based on the new results, coefficients R^2, NS, and Br^2 were respectively obtained as 0.75, 0.73 and 0.65 and performance of the model improved and its accuracy increased acceptably. In the next step, from among the studied 30 parameters, (CH_N2), (USLE_K), (USLE_P) and (OV_N) were identified as the important parameters effective in the output of the sediment yield from basin. Also, USLE_K as was diagnosed as the most sensitive parameter. Results of this survey can be used in the management of the effective parameters in sediment load. Determining exact values of the effective parameters in other studies can be helpful to improve the simulation results in similar basins, too.

Keywords: SWAT model, reverse modeling, sediment yield, Doiraj river.

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