University of Zabol
Graduate school
Faculty of Natural Resources
Department of Range and Watershed Management

The Thesis Submitted for the Degree of M.Sc (in the field of Watershed Management)

Performance Evaluation of SWAT Model to Simulation of Runoff and Sediment Yield in Doiraj River Basin in Ilam Province

Supervisors
Dr. N. Basirani
Dr. H. Karimi

Advisor
Dr. A. R. Moghadamnia

By
H. Ebrahimi

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Abstract

The importance of water and soil of human life and its role in the formation of communities and development of human civilization is no secret to anyone. Monitoring and evaluation of the water source should be considered as one of the most important activities that must be done To increase awareness and understanding about the country's water resources. Since the phenomenon of erosion and deposition is one of the most complex natural processes and many factors are involved it, the complete understanding of the effective factors in this phenomenon is really a big problem. This study done to modeling and estimation of monthly runoff and sediment yeild using SWAT model and optimize the parameters affecting on runoff sediment yeild and Determine The sensitivity and effectiveness of each of them over production of the monthly runoff and sediment yeild in the Doiraj river basin in the West of Iran, due to lack of data and the importance of simulation of runoff and sediment yeild due to the Doiraj dam in basin outlet and fertile plains in downstream. This study done using SWAT a semi-distributed model and SUFI2 algorithm. SWAT model is very practical due to the utilization of many parameters effective flow and sediment yield and the use of GIS. the period 1994 to 2000 for model calibration and the period 1994 to 2000 for model validation was used. the statistical indexes, including R^2, bR^2 and NS were used to analysis between observed and simulated data. Overall, the results of the first run of model and Evaluation of assessment indicators Show that the model performance in first run with The default data is not satisfactory for simulation of runoff and sediment yield in the Doiraj river basin. After model calibration using SUFI2 algorithm, Coefficients R^2, bR^2 and NS for the calibration of runoff, 0.75 , 0.74 and 0.65 , for the validation of runoff 0.86 , 0.50 and 0.24 were estimated respectively. Also the Coefficients for the calibration of sediment yeild, 0.63 , 0.622 and 0.33 , for the validation of sediment yeild 0.74 , 0.522 and 0.05 were estimated respectively. Also, graphs of the calibration and validation period shows that the time of maximum and minimum runoff and sediment yield is well modeled. Overall, based on the results, performance and capabilities of the SWAT model is evaluated satisfactory for simulation of the monthly runoff and sediment yield in the Doraj river basin. based on results of sensitivity analysis four parameters including (SOL_BD), (SOL_AWC), (ALPHA_BNK) and (CN2) were identified as the important parameters effective on the output of the runoff from basin That between them, SOL_BD as the most sensitive parameter was diagnosed. Also, four parameters including (CH_N2) , (USLE_K), (USLE_P) and (OV_N) were identified as the important parameters effective on the output of the sediment yield from basin That between them, USLE_K as the most sensitive parameter was diagnosed.

Key words: runoff, sediment, SWAT model, SUFI2 algorithm, Doiraj river.