

EGU2020-97, updated on 25 Feb 2021

<https://doi.org/10.5194/egusphere-egu2020-97>

EGU General Assembly 2020

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Sediment Yield Modeling in The Coastal Region of Syria Using the WEPP-Model

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Soil erosion by water is a serious problem in the coastal region of Syria. Annually, a hundred tons of soil are eroded from different ecosystems in the study area. Recently, The USDA-WEPP (Water Erosion Prediction Project erosion model) was widely used to estimate soil loss by water erosion. Unfortunately, detailed studies about the WEPP-model performance in the eastern Mediterranean in general and Syria, in particular, are still lacking. Within this context, this research undertook an assessment of the WEPP-model performance in the coastal region of Syria.

The study area is characterized by complex topography (slope ranges between 2% and 45%), heavy precipitation within short time intervals, and mixed land cover. On other hand, the most exposed ecosystems to soil erosion are agricultural (AG), burned forest (BF) and forest (FO). For this reason, experimental plots with 3 replicants in 9 different representative locations for each ecosystem were set up (81 experimental plots in total) to measure soil erosion by water. In the next step, the WEPP input files were prepared and run for each location. Finally, the WEPP performance was tested by using four statistical indexes: Pearson's correlation coefficient (r), the Nash-Sutcliffe coefficient (NSE), the percent bias (PBIAS), and RSR (the ratio of root mean square error (RMSE) to the standard deviation of the measured data).

The results showed that observed soil erosion ranges between 32 ton/h/year and 165 ton/h/year in the AG, while it ranges from 3 ton/h/year to 8 ton/h/year in the FO. Similarly, WEPP results range between 32 ton/h/year and 152 ton/h/year in the AG, while they range from 1.4 ton/h/year to 15 ton/h/year in the FO. The model performance showed a good agreement between measured and estimated values for AG systems ($R = 0.96$, $NSE = 0.84$; $RSR = 0.39$; $PBAIS = 13.05$), and a less satisfactory one for both forest and burned forest.