

## **Estimation of Soil Erosion Risk of the Euphrates River Watershed Using RUSLE Model, Remote Sensing and GIS Techniques**

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**Abstract.** The average annual soil erosion is the main problem of natural water resources and the agriculture, the most dominant factor that effect on the soil erosion is water. The aim of this study was estimated the average annual soil erosion by using RUSLE model and the ArcGIS software of the Euphrates river watershed, this model was based on five factors for calculation soil erosion map of the watershed. The rainfall-runoff erosivity (R) factor map was computed for precipitation data that content from thirty-one stations scattered within and outside the watershed area to assist in the interpolation estimation. The soil erodibility (K) factor map of topsoil was derived based on data that provided from UN-FAO (Food and Agriculture Organization of the United Nations). The topographic factor map can be depended mainly on the raw images of the Digital Elevation Model (DEM) of the watershed which DEM of Euphrates watershed consisted of sixteen images with a spatial cell size 30m\*30m. The cover/crop management (C) factor map can be calculated based on the NDVI (Normalized Difference Vegetation Index) map of the Euphrates basin, the NDVI map can be derived based on remote sensing of the data available in the United State Geological Survey (USGS) for multi-images of the study area. The support practice factor (P) can be assumed equal to 1 because the bare land area occupied about 92% of the total area for computational years 2013 and 2017. The average annual soil loss for the year 2017 was ranged from 0 to 2995.614 tons/ha/year, 99.69% of the watershed area had the slight soil erosion loss while 0.17% of the watershed was represented the soil erosion of the slight to moderate type. For the year 2013, the soil loss estimated from 0 to 2610.47 tons/ha/year, 99.7% of watershed had the slight soil erosion loss while 0.16% of the watershed was classified into the slight to moderate soil loss type. Furthermore, the other soil loss types such as moderate to extremely high were found in the riverbed of the Euphrates. The sediment delivery ratio can be computed for upstream of Al Shamia barrage based on the field value of sediment yield for the year 2013. The observation value equaled to 25.62% while it's equal to 26.12% based on the Renfro equation.