

Ozsoy G., E. Aksoy, M.S. Dirim, Z. Tumsavas (2012) Determination of soil erosion risk in the Mustafakemalpaşa River Basin, Turkey, using the Revised Universal Soil Loss Equation, geographic information system, and remote sensing. *Environmental Management* 50(4):679-694.

#### ABSTRACT

Sediment transport from steep slopes and agricultural lands into the Uluabat Lake (a RAMSAR site) by the Mustafakemalpaşa (MKP) River is a serious problem within the river basin. Predictive erosion models are useful tools for evaluating soil erosion and establishing soil erosion management plans. The Revised Universal Soil Loss Equation (RUSLE) function is a commonly used erosion model for this purpose in Turkey and the rest of the world. This research integrates the RUSLE within a geographic information system environment to investigate the spatial distribution of annual soil loss potential in the MKP River Basin. The rainfall erosivity factor was developed from local annual precipitation data using a modified Fournier index; the topographic factor was developed from a digital elevation model; the K factor was determined from a combination of the soil map and the geological map; and the land cover factor was generated from Landsat-7 Enhanced Thematic Mapper (ETM) images. According to the model, the total soil loss potential of the MKP River Basin from erosion by water was 11,296,063 Mg year<sup>-1</sup> with an average soil loss of 11.2 Mg year<sup>-1</sup>. The RUSLE produces only local erosion values and cannot be used to estimate the sediment yield for a watershed. To estimate the sediment yield, sediment-delivery ratio equations were used and compared with the sediment-monitoring reports of the Dolluk stream gauging station on the MKP River, which collected data for >41 years (1964-2005). This station observes the overall efficiency of the sediment yield coming from the Orhaneli and Emet Rivers. The measured sediment in the Emet and Orhaneli sub-basins is 1,082,010 Mg year<sup>-1</sup> and was estimated to be 1,640,947 Mg year<sup>-1</sup> for the same two sub-basins. The measured sediment yield of the gauge station is 127.6 Mg km<sup>-2</sup> year<sup>-1</sup> but was estimated to be 170.2 Mg km<sup>-2</sup> year<sup>-1</sup>. The close match between the sediment amounts estimated using the RUSLE-geographic information system (GIS) combination and the measured values from the Dolluk sediment gauge station shows that the potential soil erosion risk of the MKP River Basin can be estimated correctly and reliably using the RUSLE function generated in a GIS environment.