



Assessing the effects of the vegetation pattern and topography on the wind-driven sediment flux by GIS and Geostatistics

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The assessment of vegetation pattern is important as a physical parameter in the research of wind erosion, which is one of land degradation problems in semi-arid regions. The role of vegetation shelters is to protect soils from the corrosive effects of the wind and to capture the sediments transported from the neighboring land. In this study, we aimed to investigate the effects of vegetation pattern and topography on sediment flux by the wind erosion process in a plot scale, using GIS and Geostatistics. The study was performed in Karapinar Wind Erosion Research Station, Konya, Turkey where the wind erosion is the most degrading land process. The sediment fluxes were randomly measured in the research area of 0.25 ha with the BEST sediment traps. In the measuring period, two erosive events were recorded and the amount of transported sediments was calculated. The obtained maximum wind velocity in the events were 10.03 m s⁻¹ (average velocity is 3.64) and 8.19 m s⁻¹ (average velocity is 4.87 m s⁻¹), respectively. First event continued one hour and 25 minutes; and the maximum sediment flux was 813.96 gr m⁻² (8.16 t ha⁻¹) for the plot with intense vegetation cover. However, the sediment flux was 3633.24 gr m⁻² (356.32 t ha⁻¹) for the plot with no vegetation. The other wind storm continued 8 hour and 3 min; and the maximum sediment flux was 2755 gr m⁻² (27.56 t ha⁻¹) and 4677.70 gr m⁻² (46.76 t ha⁻¹) for the plots with and without vegetation, respectively. Using point measurements of the sediment fluxes, the spatial distribution of dust was also mapped by the GIS and Geostatistics technologies in each event. These results of the spatial analysis indicated that the sediment flux decreased significantly at both outside and inside of the vegetated plot depending upon the pattern of the plants.

Key words: Vegetation pattern, topography, wind erosion, sediment flux, Geostatistics, GIS

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