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Assessing soil erosion intensity using revised universal soil loss equation (RUSLE) in a typical hilly watershed of the Loess Plateau, China

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Soil erosion is a major threat to the soil resources. It has been considered as the primary cause of soil degradation. Recent changes in soil erosion and hydrological processes in the Loess Plateau of China, are immediate responses to land use or land cover changes induced by vegetation restoration, which lead to a long term decrease in soil erosion. Erosion and sediment yield between the upper and lower of valleys shoulder line in Loess Plateau are very different. Uncertainty exists while applying mechanism model in big and middle scale watershed and detailed erosion changes have not been clearly evaluated. In our study, the algorithm of slope length factor in terms of up-slop runoff area was mended and new algorithm of slope length factor considering the effect of land use/cover for up-slop runoff was produced. By using the revised universal soil loss equation (RUSLE), soil erosion intensity and its relationship with environmental factors were studied in a typical hilly watershed of the Loess Plateau. The results indicated that the average annual soil erosion intensity in the watershed was 4399.79 t/(km^2 a), which was in the category of moderate degree erosion. Both soil erosion intensity and amount increased significantly with the increasing of the slop gradient. 80.59% of the total soil loss occurred in the region with a gradient more than 25 degree, of which the area was 59.06% of the total watershed area. Soil erosion intensity varied with slope aspects in a trend of sunny slope>half-sunny slope>half-shady slope>shady slope. The area of sunny slope occupied 45.07% of the total watershed area, but the erosion amount of which occupied 56.50% of the total erosion amount. In different land use types, the grassland occupied 57.07% of the total watershed area, but the erosion amount of which occupied 96.37% of the total erosion amount. Consequently, grassland became the major erosion and sediment source in the watershed. Our study provides technical basis for applying RUSLE to assess soil erosion on Loess Plateau and offers useful references for water and soil resource utilization in the region.