# Soil Erosion Modeling in the Puyallup-White River Watershed: A GIS and RUSLE Approach

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The breakdown and movement of geological materials are fundamental physical processes that shape both the natural and built environment. While soil erosion is naturally driven by rainfall and runoff, human activities including agriculture, deforestation, and urban construction have significantly amplified its rate and impact. Accelerated soil erosion has led to the degradation of fertile land with its broader impacts extending to sediment transport, water quality, and ecosystem stability. The Revised Universal Soil Loss Equation (RUSLE) is an empirically derived model that estimates soil loss by integrating climatic, soil, topographic, and land use factors. Originally developed for plot-scale agricultural applications, this model has since been adapted for broader implementation, including non-agricultural and mixed-use watersheds. However, its application to watershed systems in the context of climate change remains underutilized. Here we demonstrate that integrating the RUSLE within a GIS environment enables explicit estimation of gross soil loss and spatial analysis of high-risk erosion locations across the Puyallup-White River watershed. The application of the RUSLE model to this region improves our knowledge of soil erosion and sediment transport dynamics in a system experiencing climate-driven hydrological shifts. More broadly, this approach further demonstrates how traditional erosion models can be applied to complex landscapes.