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Simulating Ephemeral Gully Erosion Using AnnAGNPS in Agricultural Fields of Southern Ontario, Canada

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Erosion of farmland due to climatic and land use changes is very severe on many unprotected farmlands around the world. Ephemeral gully (EG) erosion significantly contributes to total soil losses from upland area to stream channels and is a serious environmental and productivity problem. In the last couple of decades, a few physical and semi-empirical based prediction models have been developed to estimate EG erosion so that appropriate conservation measures can be implemented. In this study, the Annualized Agricultural Non-Point Source (AnnAGNPS) model will be used to investigate the mechanics of EGs and quantify EG erosion and also the overland erosion in selected fields across several watersheds in southern Ontario. In the selected fields, inputs of Digital Elevation Model (DEM) is being generated from Unmanned Aerial Vehicles (UAVs) equipped with a high-resolution camera, soil characteristics are being manually measured. Other inputs such as implemented management practices and available daily climate data are also being collected. Inputs collected in selected fields will be incorporated in AnnAGNPS model in which overland erosion is simulated using Revised Universal Soil Loss Equation (RUSLE) and EGs are simulated using Revised Ephemeral Gully Erosion Model (REGEM). Simulated results of overland and EG erosion will be used to understand the mechanics of EGs and their contribution to total erosion in Ontario. In addition, economic impact analysis of EG and overland erosion will be performed.