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Ephemeral Gully Erosion Advancements within the AnnAGNPS Watershed Simulation Model

Ronald Bingner[1], Robert Wells[2], and Henrique Momm[3]
[1]USDA-ARS-NSL, Oxford, Mississippi, United States of America (ron.bingner@ars.usda.gov)
[2]USDA-ARS-NSL, Oxford, Mississippi, United States of America (robert.wells.usda.gov)
[3]MTSU, Murfreesboro, Tennessee, United States of America (henrique.momm@mtsu.edu)

Concentrated runoff increases erosion and moves fine sediment and associated agrichemicals from upland areas to stream channels. Ephemeral gully erosion on croplands in the U.S. may contribute more of the sediment delivered to the edge of the field then from sheet and rill erosion. Typically, conservation practices developed for sheet and rill erosion are also expected to treat ephemeral gully erosion, but science and technology are needed to account for the separate benefits and effects of practices on each of the various sediment sources.

Watershed modeling technology has been widely developed to aid in evaluating conservation practices implemented as part of a management plan, but typically lacks the capability to identify how a source, such as sheet and rill erosion, ephemeral gully erosion, or channel erosion, is specifically controlled by a practice or integrated practices. The U.S. Department of Agriculture's Annualized Agricultural Non-Point Source pollutant loading model, AnnAGNPS, has been developed to determine the effects of conservation management plans on erosion and provide sediment tracking from all sources within the watershed, including sheet and rill, ephemeral gully, and channel erosion.

This study describes the ephemeral gully erosion capabilities within the AnnAGNPS model and discusses research needs to further improve these components for integrated conservation management planning. Conservation management planning by agencies within the U.S. and by international organizations requires a systematic approach when determining the extent of ephemeral gully erosion impacts on a field, watershed, or national basis, and/or to predict recurring or new locations of ephemeral gullies prior to their development. This technology provides the capability to separate the impact of ephemeral gullies on erosion from other sources and then evaluate the impact of targeted practices to control erosion at the source and subsequent downstream resources.