

# DELINEATION OF CRITICAL MANAGEMENT AREAS AT PLOT, FIELD, AND WATERSHED SCALES FOR CLAYPAN SOILS

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## ABSTRACT

Water and soil are two key elements for life on this planet, and improving and preserving their quality are of prime importance. Various human actions including use of intensive chemicals in agriculture have accelerated the deterioration of soil and water quality and given rise to non-point source pollutants. The claypan soil region of Missouri has a high runoff potential that increases the possibility of transport of non-point source pollutants to downstream sites.

The Agricultural Policy/Environmental eXtender (APEX) model was calibrated and validated for a 32-ha field from 1993 to 2002 for runoff, sediment, and atrazine loads. Two indices were developed using soil property and topography data, the Conductivity Claypan Index (CCI) and the Claypan Index (CPI). These indices captured 100% of CMAs in the field based on runoff and sediment yield and 75% of critical management areas (CMAs) because of atrazine load, as predicted by APEX.

CMAs were also delineated in the Goodwater Creek Experimental Watershed (GCEW) to simulate effects of placement of best management practices (BMPs) in these CMAs. Twenty-five % of the total watershed area under agricultural land use had the lowest values of indices which were treated as CMAs. The Soil and Water Assessment Tool (SWAT) model was used to confirm the CMAs delineated by indices. Targeting CMAs with BMPs delineated using the CCI and CPI indices can be an effective way to reduce the sediment and phosphorus loads from the GCEW.