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Soil health for long term productive capacity in southeast Kansas

**Abstract.**

The soils of southeast Kansas are potentially productive silt loam, underlain with an unproductive claypan layer. On-farm measurements of factors limiting crop productivity have identified high clay content as a key limitation. Moreover, the clay layer, traditionally estimated to lie 30-45 cm below the soil surface, was measured consistently higher, sometimes as high as 7.5 cm. This clay layer is massive, extensive, and restricts crop growth and productivity. Key to maintaining productivity in the area is preservation of the productive topsoil layer. Current production practices have slowly transitioned to more conservation practices, but tillage is still common. Moreover, high annual rainfall in excess of 100 cm per year exacerbates loss of topsoil through erosion. More aggressive conservation measures are needed to maintain and improve the topsoil. Agricultural activities have negatively impacted the water quality through contamination of streams with sediments and nutrients. A watershed model, developed in Hydrological Simulation Program Fortran (HSPF), was parameterized for the area to simulate non-point source watershed hydrology and water quality. Simulation results are provided as time-series of runoff, sediment load, and nutrient concentrations, along with time-series of water quantity and quality, at watershed outlets. Conservation production practices designed to improve soil health and conserve the topsoil include reduced tillage and cover crops. The watershed model is then used to simulate the environmental and productive output for the area under conventional and conservation production management practices using measurements from field studies.