# Development of a Landscape Unit Delineation Framework to assess Water Transfers across Landscape Units using SWAT

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A spatially distributed representation of basin hydrology and transport processes in hydrological models like the Soil and Water Assessment Tool (SWAT) facilitates the identification of critical source areas and the placement of management and conservation measures. Floodplains are special critical landscape features that differ from neighboring uplands in terms of their eco-hydrologic processes and functions. Accordingly, an important step in watershed modeling is the representation of floodplain and upland areas within a basin. However, currently no geo-computational framework for landscape unit delineation exists that meets the needs of the SWAT model. The goals of this research were (1) to introduce two floodplain-upland delineation methods (slope position, and variable floodplain level) with regard to their suitability for the SWAT model; (2) to present a geo-computational framework for delineating floodplain and upland landscape units in a watershed using readily available topographic data; and (3) to present an implementation of landscape units into the SWAT model to improve the spatial representation of hydrological processes in the watershed.

The methods were tested in three watersheds: A Coastal Plain watershed near Tifton (GA), a mid-western watershed near Lafayette (IN), and a Southern Plain watershed near McGregor (TX) with different climatic, hydrological and geomorphological characteristics. Evaluation of the landscape delineation methods was based on visual comparisons and error matrices (i.e. cross-tabulations of delineated versus reference data). Reference data were obtained from SSURGO flood frequency maps and FEMA flood maps. Results suggest that the slope position and the variable floodplain level method worked very well in all three watersheds. Overall accuracy values ranged from 83 to 93 % for the slope position method, and from 80 to 95 % for the variable floodplain level method.

To consider different landscape positions within a watershed, the Soil and Water Assessment Tool (SWAT) was modified by integrating a landscape routing model to simulate flow and transport processes across discretized routing units. The SWAT landscape routing model is currently being tested in the three watersheds to ensure a realistic representation of hydrologic processes within floodplain and upland areas. First model results indicate that the two landscape unit setup improves the representation of routing and transport processes across the landscape and of deposition of sediments and nutrients in the floodplain. Also, the interactions between river and floodplain can be simulated more realistically. The implementation of the landscape unit delineation framework as an automated GIS algorithm allows for an efficient landscape discretization scheme for SWAT model applications using readily available data.

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