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DERIVING LAND COVER OF A LARGE AGRICULTURAL WATERSHED FROM MULTI-TEMPORAL LANDSAT SCENES

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ABSTRACT

Determining land-cover characteristics of large watersheds for use in hydrologic models has been enhanced by application of remotely sensed data and the technologies used to interpret them. The objective of this paper was to describe and evaluate a process for obtaining land-use information for a large watershed using multi-temporal Landsat-5 Thematic Mapper (TM) images. The Kanopolis Lake watershed, which covers 6316 km 2 in central Kansas, USA, was evaluated. Land-cover data for 1992 was derived for use in the Agricultural NonPoint Source Pollution (AGNPS) hydrologic model. Due to shape, large size, and geographical location of this watershed, two early-summer Landsat TM images were required to cover the entire watershed. Both scenes were classified separately and then combined together to estimate land-cover information. ISODATA (Iterative Self-Organizing Data Analysis Technique) algorithm of unsupervised classification followed by supervised classification was performed. Initially, a Level-1 classification scheme was used, which differentiated cover classes among water, agricultural, rangeland, forest, residential, and barren areas. The agricultural areas were reclassified into winter wheat and summer crop and rangeland classified into low, medium, and high cover. Good agreement was found with other published land-cover spatial data, with consistent results across both Landsat scenes. Reliability, use of readily available data, and reasonable ease of use make these methods appropriate for hydrologic modeling of small to large watersheds.
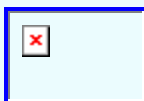
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