

Using RS/GIS to explore the impact of land-use changes on evapotranspiration and runoff in a semi-arid watershed

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Abstract The paper aims to assess the effects of land-use and land-cover changes (LUCC) on hydrological variables such as evapotranspiration and runoff in the Shalamulun watershed, China. First, land-use types were interpreted from the TM and ETM⁺ remote-sensed images via the knowledge-based decision tree (K-DT) classification method and LUCC was analysed through the post-classification comparison method. Subsequently, the two-source potential evapotranspiration (PET) model was used to estimate the potential evapotranspiration responses to LUCC. Finally, the influence of LUCC on annual runoff was determined statistically. The results show that in the period of 2001–2007, the grassland and forest had decreased by 85.36 km² and 3.92 km², respectively; both farmland and residential land have a distinct increasing tendency, increasing by 70.65 km² and 24.78 km², respectively. This change potentially leads to decrease in the annual PET and runoff. Meanwhile, the land-use types result in spatio-temporal variations of monthly PET in the growing seasons (May–September).

Key words land-use and land-cover change; potential evapotranspiration; headwater; knowledge-based decision tree