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EFFECTS OF VARIOUS LAND USE LAND COVER (LULC) DATA ON HYDROLOGICAL MODEL PERFORMANCES

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Abstract

Land cover is a significant input to hydrological models, and its features may affect model performances. To evaluate its impact on evapotranspiration, surface runoff, and water yield, we tested six open-source LULC data products (GLCC, GLC 2000, GlobCover 2005, GLCNMO V1, CLC 1990, and PELCOM) in the Emet-Orhaneli Basin located in western Anatolia. The Soil and Water Assessment Tool (SWAT) was employed to assess hydrological responses. Following the model calibration with observed streamflow data, the changes in outputs over the 1980-2012 period were compared temporally and spatially. The results revealed that temporal and spatial changes in evapotranspiration (up to 2%) and water yield were slight (up to 7%), whereas surface runoff varied more significantly in monthly and interannual intervals. The surface runoff values varied up to 70% for different LULC data in the basin scale and more distinct variations at the subbasin scale. The surface runoff values were highest (80.92 mm) in the case of using GLCC and lowest (48.13 mm) in PELCOM case. We concluded that the LULC data is crucial for estimating surface runoff and peak flow, while it is less effective in estimating evapotranspiration and total water yield. Our results may guide hydrologic modellers in selecting LULC data for specific conditions and purposes.

Key words: forest dominated basin, hydrological modeling, land cover, land use, SWAT

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