

An analysis of spatial and temporal variability of actual evapotranspiration across the Kelani river basin using remote sensing techniques

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Actual Evapotranspiration (AET) is a major component of the river basin hydrological cycle over land surface and energy balances. More than 60% of input water on land is returned to the atmosphere through evapotranspiration and it greatly influences the water availability on the land surface. Estimation of AET is an essential part in various fields. Thus, this study mainly aims at identification of the spatial and temporal variability of AET over the Kelani River Basin in Sri Lanka. Thornthwaite equation and land use conditions are mainly considered in this study to estimate AET. Average monthly temperature data has been obtained from NASA MOD1C3 and validated using observed temperature data processed by the Meteorological Department in Sri Lanka. Potential Evapotranspiration (PET) was calculated using monthly average temperature and fractional vegetation cover was calculated using Landsat images (TM, ETM and OLI) to identify the land use and land cover changes from 2000 to 2018. Both potential evapotranspiration and fractional vegetation cover are used to estimate the AET. The whole analysis used in this study has been carried out using raster calculator, zonal statistics and pivot tools in ArcGIS 10.1 software. The study revealed that land use and land cover is a major fact that determines AET. Upper catchment of Kalani River basin has shown high AET values due to the vegetation cover. Lower part of the river basin is associated with low values due to build - up areas. Due to rapid urbanization, AET has significantly decreased in 2018 over the Kalani river basin. Reducing AET can be highlighted when considering the temporal changes of AET in Kalani river basin. Evapotranspiration should be considered a major component of water cycle because it can be a significant factor affecting precipitation.

Keywords: *evapotranspiration, fractional vegetation, spatial, temporal*