

Satellite-based Regional Scale Evapotranspiration Estimation Mapping

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India is a country of agricultural background, with 140 million hectares (Mha) of fallow land out of which a myriad area of 64.4 Mha comes under the irrigated land. Improved regular and rapid monitoring techniques are needed to quantify the evapotranspiration (*ET*) precisely on agricultural fields to enhance the efficient usage of water resources and to protect the water quality and environment. Therefore, it is noteworthy to understand the estimation of *ET* on a regional scale. The present study develops an overarching framework on spatial and temporal assessment of crop evapotranspiration and the associated agro-hydro factors of Tanjore, a delta district of Tamilnadu, India. The analysis has a pivot role in incorporating the estimation of *ET* using the FAO's standardized Penman-Monteith *ET* model by considering various climatic parameters. The present study correlates alfalfa-based crop coefficient (*K_c*) and high-resolution satellite image vegetation index (*VI*) which was normalized with remodelled *K_c-VI* for the study period to generate *ET* maps. These approaches have been influential in the field because of due to the free and facilitate access. The analysis holds various climatic elements such as temperature, precipitation, soil moisture, insolation, etc., which will significantly help in understanding the climate change effects over agricultural areas on a regional scale. To stress that the analysis has been performed in-depth where the *ET* maps generated with the remodelled *K_c-VI* normalization, indicate positive stand with *RMSE* of 0.05 mm day⁻¹ for the study period which can perform an important role in the management of agro-hydro decisions on a regional scale. The *ET* maps generated at the field scale will help to enhance the irrigational pattern and utilization. The output will also be helpful to reduce the seasonal usage of irrigation water by 18% that helps to optimize the hydrological resources. The *ET* maps generated from the relation helps to project the agro-hydrological squandering at a regional scale.

Keywords: Evapotranspiration, Hydrological cycle, Penman-Monteith Model, Vegetation Index, Delta region