Piyapong Tongdeenok 2006: Estimating Evapotranspiration of Paddy Field and Teak Plantation Using Remote Sensing. Doctor of Philosophy (Forestry), Major Field: Forestry, Interdisciplinary Graduate Program. Thesis Advisor: Associate Professor Samakkee Boonyawat, Ph.D.138 pages. ISBN 974-16-2823-4

The objectives of this study are to investigate energy balance, micrometeorological characteristics and evapotranspiration of paddy field and teak plantation by using bowen ratio technique, to find out the relationship among evapotranspiration, remote sensing data and micrometeorological data of these 2 land use types and to find out the suitable models that can estimate actual evapotranspiration (ET_a)by using simple climatic data and remotely sense data. The investigation period was coverd 2 years and 8 months from January 2002 to September 2004, and taking account of 17 images from NOAA/AVHRR satellite.

The results shown that the daily average solar radiation (Rs) in paddy field was 19.3 MJ m^{-2} day^{-1} . The Rn was 13.2 MJ m^{-2} day^{-1} and used for latent heat (LE), Sensible heat (H) and storage in soil and water (Gs and Gw) with the average value of 9.5, 3.0, 0.4 and 0.2 MJ m^{-2} day^{-1} or 72.3, 2.9, 3.1 and 1.7% of Rn respectively. While in teak plantation the daily average Rs was 19.0 MJ m^{-2} day^{-1} . The avergae daily of Rn was 14.8 MJ m^{-2} day^{-1} or 78.2% of Rs. The Rn was used for LE, H and Gs about 71.6, 23.0 and 5.4% of Rn respectively. The average daily ET_a of the whole peroid study in paddy field was 4.1 mm. while the average daily ET_a of teak plantation was 3.9 mm.

The relationship between ET_a and remote sensing parameter such as normalized difference vegetation Index (NDVI), land surface temperature (LST) and surface albedo (Sur_alb) of each site are as follows. In paddy field for the whole period ET_a = -1.21+ 0.73 (NDVI) + 0.19 (LST) + 4.02 (Sur_alb), r^2 = 0.71, during rice planting season ET_a = 3.99 + 0.83 (NDVI) + 0.01 (LST) +1.61(Sur_alb), r^2 = 0.65 and off rice planting season ET_a = -1.93 + 1.42 (NDVI) + 0.2 (LST) + 7.44 (Sur_alb) ,r^2 = 0.85. Teak plantation for the whole period ET_a = -2.87 + 0.18 (NDVI) + 0.27 (LST) + 0.57(Sur_alb): r^2 = 0.4, rainy season ET_a = 3.7 - 0.60 (NDVI) + 0.07 (LST) + 4.57 (Sur_alb) , r^2 = 0.64 and in dry season was ET_a = -4.23-0.0004(NDVI)+0.37(LST)-5.8 (Sur_alb), r^2 = 0.60. The relationship between estimated ET_a and measurement ET_a was similar with high significant pattern direction. While the relationship between ET_a and micrometeorological data was not applicable only some month has significant relationship but for the whole not recommend to use micrometeorological data to develop model for prediction ET_a anymore in the future.

However, the remote sensing approach is applicable for ET_a estimation, in view of the advance, it provides spatial distribution and large-area, although, NDVI, surface albedo and surface temperature were easy to get from satellite image when compare with measurement method.

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