

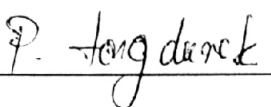
Piyapong Tongdeenok 2006: Estimating Evapotranspiration of Paddy Field and Teak Plantation Using Remote Sensing. Doctor of Philosophy (Forestry), Major Field: Forestry, Interdisciplinary Graduate Program. Thesis Advisor: Associate Professor Samakkee Boonyawat, Ph.D. 138 pages. ISBN 974-16-2823-4

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 covered 2 years and 8 months from January 2002 to September 2004, and taking account of 17 images from NOAA/AVHRR satellite.

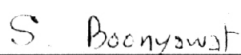
The results shown that the daily average solar radiation (R_s) in paddy field was $19.3 \text{ MJ m}^{-2} \text{ day}^{-1}$. The R_n was $13.2 \text{ MJ m}^{-2} \text{ day}^{-1}$ and used for latent heat (LE), Sensible heat (H) and storage in soil and water (Gs and Gw) with the average value of 9.5, 3.0, 0.4 and $0.2 \text{ MJ m}^{-2} \text{ day}^{-1}$ or 72.3, 2.9, 3.1 and 1.7% of R_n respectively. While in teak plantation the daily average R_s was $19.0 \text{ MJ m}^{-2} \text{ day}^{-1}$. The average daily of R_n was $14.8 \text{ MJ m}^{-2} \text{ day}^{-1}$ or 78.2% of R_s . The R_n was used for LE, H and Gs about 71.6, 23.0 and 5.4% of R_n respectively. The average daily ET_a of the whole period 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 $ET_a = -1.21 + 0.73 (\text{NDVI}) + 0.19 (\text{LST}) + 4.02 (\text{Sur_alb})$, $r^2 = 0.71$, during rice planting season $ET_a = 3.99 + 0.83 (\text{NDVI}) + 0.01 (\text{LST}) + 1.61 (\text{Sur_alb})$, $r^2 = 0.65$ and off rice planting season $ET_a = -1.93 + 1.42 (\text{NDVI}) + 0.2 (\text{LST}) + 7.44 (\text{Sur_alb})$, $r^2 = 0.85$. Teak plantation for the whole period $ET_a = -2.87 + 0.18 (\text{NDVI}) + 0.27 (\text{LST}) + 0.57 (\text{Sur_alb})$, $r^2 = 0.4$, rainy season $ET_a = 3.7 - 0.60 (\text{NDVI}) + 0.07 (\text{LST}) + 4.57 (\text{Sur_alb})$, $r^2 = 0.64$ and in dry season was $ET_a = -4.23 - 0.0004 (\text{NDVI}) + 0.37 (\text{LST}) - 5.8 (\text{Sur_alb})$, $r^2 = 0.60$. 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.



Student's signature

 21/Oct/06

Thesis Advisor's signature