CROP & TREE WATER USE IN 2 MAE CHAEM SUB-WATERSHEDS

LITERATURE REVIEWS

- The Soil Water Balance module of DSSAT 4 computes water balance on a daily basis. Processes directly affect water content in the soil profile throughout the simulation season (Pritch, 1985) using the equation:
  \[ S = P + I - EP - ES - R - D \]
  Where S = Changes in soil water content
  P = Precipitation
  I = Infiltration
  EP = Evapotranspiration
  ES = Soil Evaporation
  R = Runoff
  D = Drainage from Soil Profile

- Crop Water Use or Evapotranspiration (ET), is the water lost to the atmosphere by: evaporation, and transpiration. Evaporation is loss from open bodies of water and soil, whereas transpiration is loss from plant surfaces.


- Agriculture represents 70% of global water use (FAO, 2005), making it an important part of water resource management and affecting the water balance landscapes of all scales.

Graph 1 shows the use of DSSAT 4 to simulate economic crop development in 2 sub-watersheds of Mae Chaem (Mae Kong Kha & Mae Suk). Crops include paddy rice, upland rice, maize, soybean, and shallots; planting dates were simulated weekly during the year.

Simulation results show water use rates of each economic crop when simulated 1) using management practices used by farmers in the area; 2) for planting dates in each week of the year.

The potential evapotranspiration of all crops is higher than actual evapotranspiration in both sub-watersheds. This means there is a deficit in the quantity of water used in these sub-watersheds, so yield should vary according to crop water use, soil properties and management levels.

CONCLUSIONS

The model’s minimum dataset for a single year can be used to simulate water balance and other model outputs for that year. But in order to forecast future crop yield and water balances, DSSAT needs at least 10 years of basic climate data.

Estimated water loss from crop and tree use in study areas can be calculated from model output data and existing secondary data in the area.

Results can be used to support water management and planting decisions, and help avoid drought periods and water conflict situations.

Water Balance can be used to evaluate impact of water loss from intensive agriculture on watershed functions.

REFERENCES


Food and Agriculture Organization (FAO) in Graph 2.

Simulated data are compared with crop water use data from secondary sources, such as Royal Irrigation Department (RID) and Food and Agriculture Organization (FAO) in Graph 2.

Crop water use of all crops are generally similar, except upland rice is higher than FAO data. This simulation uses genetic coefficients for long-season upland rice, which may be different from FAO.