Dry Season Evaporation From Pine Forest Stand In The Middle Mountains Of Nepal

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Abstract

The quantification of dry season evaporation in regions, where the magnitude of dry season flows is key to the regional water supply, is essential for good water management. Also, tree transpiration has a significant role in the water balance of a catchment whenever it is tree populated, especially in water limited environments. Such is the case in the Middle Mountains of Nepal where dry season flows play a significant role in downstream water provisioning and their proper functioning is key to the welfare of millions of people. This research seeks to study the transpiration of a pine forest stand in the Jikhu Khola Watershed in the Middle Mountains of Nepal. To the author's knowledge, no single study has been made so far to estimate the dry season evaporation from the planted forest stand in the Middle Mountains of Nepal. The study was carried out in planted pine forest embedded within the Jikhu Khola Catchment. Field campaigns of sap flow measurements were carried out from September, 2010 to February, 2011 in the selected plot of 15*15m dimension, to characterize dry season evaporation. This was done by measuring sap fluxes and sapwood areas over the six trees of different Diameter at Breast Height (DBH) classes. The sap flux was assessed using Granier's thermal dissipation probe (TDP) technique while sapwood area was determined using several incremental core(s) taken with a Pressler borer and immediately dyeing with methyl orange for estimating the actual depth of sapwood area. Transpiration of the plot was estimated by considering the contribution of each tree class. For this purpose, sap flux density, sapwood area and the proportion of total canopy area were determined for each tree class of the selected plot. From these data, hourly and diurnal transpiration rates for the plot were calculated for experimental period. Finally, Cienciala model was parameterized using the data recorded by the ADAS and other terrain data collected in the field. The calibrated model allowed the extrapolation of Sap flux density (v) over a six month period, from September 2010 to February 2011. The model given sap flux density was validated with the measured sap flux density from Grainier method.

Keywords : Sap Flux Density, Diameter at Breast height (DBH), Thermal Dissipation Probe (TDP)

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