



Vol. 44, No. 2, pp 191-197, 2016

Indian Journal of Soil Conservation

Online URL: <http://indianjournals.com/ijor.aspx?target=ijor:ijsc&type=home>



Application of SEBAL model to estimate Evapotranspiration in Doon Valley, India

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ARTICLE INFO

Article history:

Received : October, 2014

Revised : November, 2014

Accepted : July, 2016

ABSTRACT

The knowledge of actual water use for different land uses particularly for agricultural crops is considered as one of the major factors for water resource planning and irrigation water management. However, actual water use of a land use is mainly determined by its actual evapotranspiration (ET_a). In recent times, with the advent of new satellite technology, spatio-temporal evapotranspiration can be measured from remotely sensed surface temperature using various surface energy balance algorithms. In this study, SEBAL (Surface Energy Balance Algorithm for Land) technique has been used to measure the spatial variation of actual evapotranspiration (ET_a) from Landsat 5 image prevailing in the Doon Valley, Uttarakhand, India. This particular method utilizes the combination of meteorological observations with information extracted from remote sensing data to calculate evapotranspiration and other energy exchanges at earth's surface. The result shows that SEBAL ET_a varies between 3.3 mm day^{-1} and 4.9 mm day^{-1} in the study area. The estimated ET_a was compared with the vegetation indices and surface temperature to see their variations among the classified land cover classes. Terraced agriculture has the highest ET (4.9 mm day^{-1}) partly due to its crop growth stage as compared to other land cover classes. Spatio-temporal distribution of actual ET can assist us to better understand evapotranspiration pattern of different land use systems and would help to establish links between land use, water allocation, and water use planning.

Key words :

Doon Valley,
Evapotranspiration,
GIS,
Remote sensing,
SEBAL