Estimation of R factor using hourly rainfall data.

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Abstract

Soil erosion is a very serious problem from agricultural as well as environmental point of view. Various computer models have been used to estimate soil erosion and assess erosion control practice. Universal Soil loss equation (USLE) is a popular model which has been used in many countries around the world. Erosivity (USLE R-factor) is one of the USLE input parameters to reflect impacts of rainfall in computing soil loss. Value of R factor depends upon Energy (E) and maximum rainfall intensity of specific period ($I30_{max}$) of that rainfall event and thus can be calculated using higher temporal resolution rainfall data such as 10 minute interval. But 10 minute interval rainfall data may not be available in every part of the world. In that case we can use hourly rainfall data to compute this R factor. Maximum 60 minute rainfall ($I60_{max}$) can be used instead of maximum 30 minute rainfall ($I30_{max}$) as suggested by USLE manual. But the value of Average annual R factor computed using hourly rainfall data needs some correction factor so that it can be used in USLE model.The objective of our study are to derive relation between averages annual R factor values using 10 minute interval and hourly rainfall data and to determine correction coefficient for R factor using hourly Rainfall data.75 weather stations of Korea were selected for our study. Ten minute interval rainfall data for these stations were obtained from Korea Meteorological Administration (KMA) and these data were changed to hourly rainfall data. R factor and $I60_{max}$ obtained from hourly rainfall data were compared with R factor and $I30_{max}$ obtained from 10 minute interval data. Linear relation between Average annual R factor obtained from 10 minute interval rainfall and from hourly data was derived with R2=0.69. Correction coefficient was developed for the R factor calculated using hourly rainfall data.. Similarly, the relation was obtained between event wise $I30_{max}$ and $I60_{max}$ with higher R2 value of 0.91. Thus $I30_{max}$ can be estimated from $I60_{max}$ with higher accuracy and thus the hourly rainfall data can be used to determine R factor more precisely by multiplying Energy of each rainfall event with this corrected $I60_{max}$.

Key words :: Soil Erosion, Erosivity, Module, Regression equation

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