

Combining Survey and Satellite Data to Obtain Small Area Estimates of the USLE C-factor

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Abstract

One of the main driving factors behind sheet and rill erosion is the C-factor, which quantifies the effect of crop managements. Estimates of the C-factor at detailed geographic levels can inform researchers and policy makers. Use of remotely sensed data to estimate the C-factor is appealing because satellite data often provides complete coverage of the population of interest. However, estimates of the C-factor based on remote-sensing data alone can suffer from poor data quality. While probability-based surveys can overcome these quality issues, estimates for granular geographic domains based on survey data can be unstable due to small sample sizes. Small area estimation procedures combine satellite data with survey data, thereby leveraging the strengths of both data sources. Small area estimation for the C-factor is challenging. An appropriate procedure should reflect the complexities of the survey design and the fact that the support of the C-factor is the unit interval. This motivates us to develop a novel small area procedure for a complex design based on the beta distribution. We apply the method to obtain county estimates of the C-factor. Estimates are produced for quantiles as well as the mean C-factor.