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Developing an Erosion Rate Map for Myanmar Using USLE, GIS and Remote Sensing

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Predicting erosion and estimating sediment loads in rivers are of major tasks in water resources system planning and management. In Myanmar erosion and collapse of river banks is common during the rainy season and riverine communities are frequently forced to relocate as their homes are dangerously close to the disintegrating river banks (Mann 2013). Myanmar is one of climatically most diverse countries located in Southeast Asia, where sheet, rill, and gully erosion affect crop yields as well as livelihood strategies of many people (Htwe, Brinkmann et al. 2015). In Myanmar, soil erosion measurement and monitoring approaches are increasingly important for land management planning to effectively avoid erosion and soil degradation, but such monitoring is limited by the availability of data and budgetary constraints. Therefore, spatial modeling approaches using GIS and remote sensing techniques play an important role for rapid risk assessments (Htwe 2016).

In this study ”Model Builder” tool in ArcGIS was used to create a model which generates an erosion rate map using Universal Soil Loss Equation (USLE). USLE is the product of five factors: rainfall erosivity factor (R), soil erodibility factor (K), slope length and steepness factor (LS), crop management factor (C), and support practice factor (P).

Input data files for this model were acquired from online open source databases. Precipitation data was downloaded from Tropical Rainfall Measuring Mission (TRMM) for calculation of R factor. The resolution of TRMM data is very coarse (0.25 degree $\times$ 0.25 degree), therefore it was spatially downscaled by developing a relation between TRMM and Normalized Difference Vegetation Index (NDVI) using regression analysis method. Soil maps depicting percentages of sand, clay and silt were obtained from soilgrids website for calculation of K factor. Digital Elevation Model (DEM) with resolution of 90 meters was taken from Shuttle Radar Topography Mission (SRTM) for calculation of LS factor; and the satellite images from Landsat 8 were used for calculation of C factor. Due to lack of spatial distributed data, the P factor was set to 1.

This procedure provides a good estimate of erosion rates, but certainly field verification is required. This methodology can be used in regions where there is low density of weather stations. It can be used by policy makers to identify the areas with high risk of erosion and to mitigate the erosion effects.

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