Proposing a new regional sediment discharge predictor based on observed data from Taiwan.

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Modeling changes in the flux of sediments from large river basins over the time scale of years to decades is a difficult undertaking. The complexity of climate change coupled with anthropogenic influences both on land and water resources introduces a high degree of uncertainty with regard to the conventional models of predicting basin scale yearly sediment discharge. These conventional methods have over the past decades predicted annual sediment flux by using basin area and mean elevation with calibrations done against hydrometric data. The challenge therefore is in the need to develop models consisting of time dependent sediment flux parameters and the capability of the models to be transferable from basins with hydrometric data to ungauged basins. In this paper, a new basin scale sediment flux predictor is presented. Taiwan sediment discharge data is used to develop a new regional sediment flux predictor that incorporates percentage vegetation cover, soil erodibility and basin run-off. Analysis of mean percentage vegetation cover, basin run-off and mean basin slope shows defining links to basin sediment flux with correlation coefficients, R , of 0.64, 0.57, and 0.64 respectively. Soil erodibility has a weak correlation factor R of 0.13 with sediment discharge, however, the variation of slope angle to soil erodibility displays a strong correlation factor R of 0.57. This new Regional Sediment Discharge Predictor in comparison to the observed annual sediment discharge data of 14 rivers in Taiwan displays a correlation factor R of 0.76. In comparison to the global sediment flux predictor known as the Area-Relief-Temperature (ART) predictor, the new predictor shows an improvement by 182% for the Taiwan case. Further verification of the new predictor on 5 regional scale rivers in New Guinea shows model prediction within 21% of the observed values. River discharge, vegetation cover and soil type is successfully incorporated to do basin scale annual sediment flux prediction.