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ACCEPTED MANUSCRIPT

INTEGRATED UNIVERSAL SOIL LOSS EQUATION (USLE) AND GEOGRAPHICAL INFORMATION  
SYSTEM (GIS) FOR SOIL EROSION ESTIMATION IN A SAP BASIN; CENTRAL VIETNAM

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### Abstract

Soil loss due to erosion is a global problem, especially affecting natural resources and agricultural production. In fact, soil erosion is one of the most dangerous hazards. Central Vietnam is very susceptible to soil erosion due to its complicated terrain and heavy rainfall. The study was conducted in the A Sap river basin, A Luoi district, Thua Thien Hue Province, Vietnam, using the Universal Soil Loss Equation (USLE) and Geographical Information System (GIS) to determine the soil erosion circumstances. The results show that 34% of land area lost accumulated to 10 tons ha<sup>-1</sup> year<sup>-1</sup> while 47% of the total area lost less than 1 ton ha<sup>-1</sup> year<sup>-1</sup>. Natural forest land lost the most with an average of about 19 tons ha<sup>-1</sup> year<sup>-1</sup>, followed by plantation forest with approximately 7 tons ha<sup>-1</sup> year<sup>-1</sup> and other agricultural lands at 3.70 and 1.45 tons ha<sup>-1</sup> year<sup>-1</sup> for yearly crops and paddy rice respectively. The topographic factor (LS) is most influential to soil erosion rate in different location followed subsequently by the practice support factor (P), soil erodibility factor (K), cropping management (C), and the rainfall erosivity factor (R). The study also pointed out that the combination of available data sources to USLE and GIS technology is a viable option to calculate soil erosion in Central Vietnam. Although more attention towards the solution is required to reduce the soil erosion rate in future. The result indicates that changes to the cultivated calendar and implementing intercropping are effective ways for cultivated land to prevent soil erosion. Furthermore, introducing broad leaves trees for mountainous areas in A Sap basin is the most effective practice in reducing soil erosion.

**Keywords:** Central Vietnam, GIS, Soil erosion, USLE.

### INTRODUCTION

Soil loss due to erosion is a global problem, especially affecting natural resources and agricultural production (Pimentel, 2006; Parveen et al, 2012; Bakker et al, 2005; Ighodaro et al, 2013; Littleboy et al, 1992) The average rates of soil erosion throughout the world are estimated between 12 to 15 tons ha<sup>-1</sup> year<sup>-1</sup> (Biggelaar et

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