APPLICATION OF NUCLEAR TECHNIQUES AND SOIL PROPERTIES IN ASSESSING SOIL EROSION: A STUDY IN *PAYINDIKULAMA* TANK COMMAND AREA IN ANURADHAPURA

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The Fallout Radio Nucleotide (FRN) technique was used to understand and quantify the rate of soil erosion/deposition under different land uses in *Payindikulama* reservoir command area in Anuradhapura. Six soil samples were collected in three parallel transects from natural forest, *chena* cultivation, coconut plantation, agro well farming, home garden and paddy land. Activity concentrations of radionuclides of ^{137}Cs and ^{210}Pb were measured using hyper pure germanium gamma detector. Radioactivity values for ^{137}Cs and ^{210}Pb were converted to soil erosion/deposition values using mass balance model II and I, respectively. Soil samples were also tested for available P, exchangeable K, OM %, soil pH, and EC. The highest ($p<0.05$) soil erosion rate was reported in *chena* lands (-35.3 t ha^{-1} yr^{-1} in ^{137}Cs and -34.1 t ha^{-1} yr^{-1} in ^{210}Pb methods) while natural forests had the lowest ($p<0.05$) soil erosion (-0.6 t ha^{-1} yr^{-1} and -0.5 t ha^{-1} yr^{-1}, ^{137}Cs and ^{210}Pb methods respectively). Paddy lands showed soil deposition of 9.0 t ha^{-1} yr^{-1} in both methods. The highest ($p<0.05$) available P, exchangeable K and OM% were reported in coconut plantations, forest lands and paddy lands respectively. Regardless of land use, OM% and soil erosion revealed a significant positive relationship ($p<0.05$, $R^2 = 0.75$). In all land uses studied, significant correlation exists between estimated soil erosion using ^{137}Cs and ^{210}Pb methods. It was concluded that, *chena* cultivation was associated with the highest rate of soil erosion than other land uses. Paddy land serves as a sink for eroded soils from other land uses.

Keywords: Fallout radionuclides, Land degradation, Land use, Nutrients availability