Assessing Soil Erosion and Carbon Storage in Agricultural Soils: A Case Study in Ceylon Orchard Agro (Pvt) Ltd.

Abstract Body Soil erosion is a major environmental issue in the world that affects soil quality, soil health, and productivity of agricultural lands. Detection of soil erosion and quantification of soil loss is crucial for effective land management in plantations. The study was conducted in Ceylon Orchard Agro (Pvt) Ltd in Udugama which belongs to the low country wet zone of Sri Lanka. The main objectives of the study were to estimate the soil erosion and carbon storage in the Ginganga Estate under current and future climate scenarios employing a modelling approach. Integrated Valuation of Ecosystem Services and Trade-offs (InVEST 3.12.0), InVEST Sediment Delivery Ratio (SDR) and InVEST Carbon models developed by Natural Capital (NatCap) Project, in partnership with Stanford University were used to assess soil erosion and carbon storage. Soil erosion assessment was conducted within the baseline period (2001-2021), mid-century (2040-2069), and end-century (2070-2099). Results show that for baseline period, mid-century, and end-century total soil loss ranges from 0 to 188 t ha-1year-1, 0 to 157 t ha-1 year-1, 158 t ha-1year-1 with an annual average of 10 t ha-1year-1, 8 t ha-1year-1, 8 t ha-1year-1 respectively whereas, predicted mean annual soil loss ranges from 242 t ha-1 year-1, 202 t ha-1 year-1, and 205 t ha-1year-1respectively. According to the rainfall data obtained, the baseline period received the highest rainfall. Therefore, in baseline period results shows the highest predicted mean annual soil loss and total soil loss. According to the carbon storage assessment total carbon storage map shows an average of 60 t ha-1year-1. According to the results, aboveground biomass is the dominant source of carbon among the main carbon pools. The findings of the current study will be useful in developing agricultural soil conservation practices that will mitigate the present situation of soil erosion and improve soil quality and agricultural productivity.