

# Effects of Land Use Change on Soil Organic Carbon Stock in Balkhu Khola Watershed Southwestern Part of Kathmandu Valley, Central Nepal

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## Abstract

Soils of the world are potentially viable sinks for atmospheric carbon and may significantly contribute to mitigate the global climate change. Soil organic carbon (SOC) content exhibits considerable variability spatially both horizontally according to land use and vertically within the soil profile. Land use and management are among the most important determinants of SOC stock. Present study was focused on implication of land use changes for SOC sinking, as its major objective was land use change effect on SOC stock. Land use change was analyzed using GIS tool and soil samples were collected by stratified random sampling technique within the Balkhu Khola watershed. Forests were degraded notably within first analysis period (1978-1994) and in later 11 years (1994-2005) positive sign of forest conservation was seen as Bush land was transformed to forested land. Land use and soil depth both affect significantly on SOC stock. It was found that forest soil was good potential for sinking SOC having capacity of 8.12kgC/m<sup>2</sup>. Rainfed upland cultivation (Bari) has sunk 6.12kgC/m<sup>2</sup> and irrigated lowland cultivation (Khet) has sunk 4.93kgC/m<sup>2</sup>. The forest soil of 0-13 cm depth has contributed almost 50.6% of total SOC stock; Khet sunk 44.2% while Bari contributed only 31 % of total SOC. The estimated amount of SOC in Balkhu Khola watershed was found to be 257.71 MTC among which forest contain 107.61 MTC (41.76%) and cultivation 146.68 MTC (56.92%). Land use and soil depth also has significant effect on bulk density (BD) of soil. BD was found less in forest soil compared to Bari and Khet in all depth, which shown negative correlation with SOC. Conversion of forest to cultivation, and other land uses has resulted loss of SOC while reverse phenomenon enhanced the SOC stock. The Balkhu Khola watershed has gained net SOC by 10.36 MTC during 27 years period because of promotion of regrowth of forested land.

## **Keywords**

**Bulk Density, Conversion, Land use Change, Sink, Soil Organic Carbon**