



## **Soil organic matter quality under land use changes in a Nepalese watershed**

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Land use change is one of the anthropogenic interventions that may induce substantial modifications to both the quantity and quality of soil organic matter (SOM). Soils from three cultivated areas (2 types of rain-fed upland and one irrigated lowland) and two forests (a subtropical managed one and a temperate unmanaged one) in a mid-hill watershed of Nepal were studied in order to assess the effect of land use change on SOM quality. Bulk SOM was analyzed using solid-state  $^{13}\text{C}$  nuclear magnetic resonance (NMR), and fractionated by acid hydrolysis into pools with different chemical composition and, thus, different lability to decomposition. NMR analysis showed a prevalence of O-alkyl C over other C forms in all land use types, and only small variations in alkyl C and aromatic C for the different soils and horizons of the same soil. Acid hydrolysis revealed that the recalcitrant carbon pool is larger in the 20-40 cm than in the 0-20 cm soil depth of each land use. Labile C was larger in the temperate unmanaged forest and the irrigated cultivated land than in the other soils, at both soil depths. Of the cultivated rain-fed soils, the recently reclaimed soil contained smaller labile pools than the historically cultivated soil, while the labile pools in the irrigated soil exceeded those in both rain-fed soils. The results suggest that changes in land use from forest to arable and the irrigation of the cultivated land may significantly affect not only the quantity but also the quality of soil organic matter. As a consequence, any future decisions regarding land management in the fragile mountain areas of Nepal should be carefully pondered with respect to the nature of SOM.