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## What is the optimal level of soil organic matter in tropical climates to prevent soil degradation?

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Land degradation emerges when a critical component of productive land begins to diminish beyond a threshold. In tropical soils, organic matter may vary depending on the local climatic conditions and production of litter and organic materials and furthermore drastic changes in land use may be responsible for changes in organic matter which coincides with soil physical changes. In two research regions in mountainous (sub) humid conditions, organic matter was measured alongside surface and profile characteristics. In the Ethiopian Highlands, we measured organic matter, soil penetration resistance, soil texture, pH, and bulk density in three land use classifications (native forests, pasture lands, croplands). In this region, soil in cropped regions and pasturelands had organic matter roughly below 4 %, had greater soil penetration resistance, lower pH (more acidic), and had greater bulk density. Soils in the native forests had organic matter roughly between the range of 4% to 12 % with lower soil penetration resistance, higher pH (less acidic) and lower bulk density.

The soils were investigated in the Andean region of the southwest of Colombia were analyzed for organic matter, hydraulic conductivity, soil texture, pH, and bulk density across two main land use classifications (native- and regenerated-forests and cultivated and pastureland). Soils in the cropped and pasturelands had organic matter around 4.8%, with low saturated hydraulic conductivity, greater fraction of fine particles, lower pH (more acidic), and greater bulk density. Soils in the native and regenerated forest cover had organic matter between 5 to 7%, with greater saturated hydraulic conductivity, lower fraction of fine particles, higher pH (less acidic), and a lower bulk density. While a universal optimal level of soil organic matter may not be applicable across various tropical regions, there are distinct changes that are consistent when organic matter falls below a regional threshold including increased compaction, acidity, and shifting of soil texture.