



Spatial patterns of soil nutrients and groundwater levels within the Debre Mawi watershed of the Ethiopian highlands

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Persistent patterns of erosion have emerged in the Ethiopian highlands leading to soil and water conservation practices being implemented throughout the countryside. A common concern is the loss of soil fertility and loss of soil water. This study investigates the spatial patterns of soil nutrients and water table depths in a small sub-watershed in the northwestern Ethiopian highlands. NPK, a particularly important group of nutrients for inorganic fertilizer considerations, did not follow a consistent trend as a group along and across slope and land use transects. Whereas nitrogen content was greatest in the upslope regions ($\sim 0.1\%$ TN), available phosphorus had comparably similar content in the different slope regions throughout the watershed (~ 2.7 mg/kg). The exchangeable cations (K, Ca, Mg) did increase in content in a downslope direction (in most cases though, they were highest in the middle region) but not consistently later in the season. On average, calcium (40 cmol/kg), magnesium (5 cmol/kg), and potassium (0.5 cmol/kg) were orders of magnitudes different in content. The perched water table in different areas of the watershed showed a very distinct trend. The lower part of the sub-watershed had shallower levels of water table depths (less than 10 cm from the surface) than did the upper parts of the sub-watershed (usually greater than 120 cm from the surface). The middle part of the sub-watershed had water table depths located at 40 to 70 cm below the surface. These results show how the landscape slope position and land use may be important for planning where and when soil nutrients and water would be expected to be appropriately “conserved” or stored.