



## Spatial Analysis of Soil Water Content in Newly Implemented Agricultural Bench Terraces in the Ethiopian Plateau

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In arid areas prone to desertification and soil erosion, the effectiveness of agricultural bench terraces in increasing soil moisture is dependent on their correct implementation. However, despite its relevance for securing food production in many areas of the world, the relationship between proper terracing implementation and the landscape capacity of holding soil moisture is still not understood. Moreover, spatial patterns of Soil Water Content (SWC) within the same terraced hillslope are weakly studied. The present work analyses SWC variations in four newly implemented terraced sites in Tigray Region, Ethiopia: Teshi, Ruba Feleg, Michael Emba and Enda Chena. Field SWC data were collected for the dry season of 2017 (February, March and April) from the upper, middle and lower part of each terraced site, including a non-terraced benchmark area. In all sites, terraced areas show SWC significantly higher than non-terraced ones ( $p < 0.05$ ), with the lower part of the terraced hillslope more humid than the others for the whole period analyzed. A Multiple Linear Regression (MLR) analysis of SWC was conducted in order to highlight possible dependencies of SWC values. MLR highlighted significant dependency of SWC from the date of analysis, the position of the sample in the terraced slope, as well as a significant positive correlation of SWC with the percent of Water Stable Aggregates (WSA) analyzed at the study sites. Since high soil disturbance induces low soil aggregates stability, this result shows how measures to reduce soil disturbance during implementation can significantly increase SWC of radical terraces. Overall, the results of the present paper testify the good performances of bench terraces in Northern Ethiopia in terms of water conservation, and this first benchmark study can inform future terracing implementation in some arid and semi-arid agricultural areas of the world.

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