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Impacts of Soil and Water Conservation Practices on Sediment Trapping, Landscape Connectivity and Sustainable Reservoir use, Northwest Highlands of Ethiopia

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Abstract

Soil and water conservation practices (SWCPs) have been implemented in many parts of Ethiopia for the past 4 to 5 decades, however, farmers' are destructing the constructed SWCPs claiming lack of short-term benefits like minimizing landscape connectivity, reducing soil erosion, improving soil fertility and consequently increasing crop productivity. The aim of this study was to investigate the impacts of SWCPs age on sediment trapping, soil moisture conservation, slope gradient change and crop yield, in Koga catchment, in the northwest highland of Ethiopia. Physical (Fanya Juu and soil bund) and biophysical (Fanya Juu integrated with grass) SWCPs were investigated using field experiment. SPSS version 24 software was used for data analysis. Three treatments were designed in three replications: (i) Fields treated with Fanya Juu (FJ), (ii) Fields treated with soil bund (SB), and (iii) Fields treated with a combination of FJ and Grass (G). The investigated SWCPs were grouped into three age classes (<5 years, 5-10 years and >10 years). The result shows that significantly higher maize grain yield was recorded in fields treated with aged SWCPs than recently constructed SWCPs. Maize grain yield was also higher in fields treated with biophysical SWCPs than fields treated with physical SWCPS alone. Unlike aged SWCPs, significantly higher amount of sediment was recorded behind recently constructed SWCPs because of soil erosion from the newly constructed unstable soil ridges in addition to soil erosion from upslope fields. The sediment trapping efficiency of SWCPs decreases as age increases, because, the area of sediment deposition was filled by sediment due to lack of maintenance. Aged SWCPs significantly reduced slope gradient due to the long years trapped sediment and man-made ridge lines made during construction. In general, although the investigated SWCPs improved crop grain yield, maintained soil moisture and reduced slope gradient; the effects were insignificant compared with expectations after 4-5 decades. For instance, slope gradient did not change to its minimum. Hence, researchers and experts are expected to develop alternative approaches like ''Slope Reversing Terrace (SRT)'' or modify the existing practices, after half of a generation age experience.

Keywords: Fanya Juu; Soil Bund; Maize Grain Yield; Slope Gradient; Slope Reversing Terrace; Soil Moisture Content

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