



Effects of soil and water conservation on crop productivity: Evidences from Anjenie watershed, Ethiopia

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Widespread soil and water conservation activities have been implemented in many parts of eastern Africa to control soil erosion by water and improve land productivity for the last few decades. Following the 1974 severe drought, soil and water conservation became more important to Ethiopia and the approach shifted to watershed based land management initiatives since the 1980s. To capture long-term impacts of these initiatives, a study was conducted in Anjenie Watershed of Ethiopia, assessing fanya juu terraces and grass strips constructed in a pilot project in 1984, and which are still functional nearly 30 years later. Data were collected from government records, field observations and questionnaire surveys administered to 60 farmers. Half of the respondents had terraced farms in the watershed former project area (with terrace technology) and the rest were outside the terraced area. The crops assessed were teff, barley and maize. Cost-benefit analyses were used to determine the economic benefits with and without terraces, including gross and net profit values, returns on labour, water productivity and impacts on poverty. The results indicated that soil and water conservation had improved crop productivity. The average yield on terraced fields was 0.95 t ha^{-1} for teff (control 0.49), 1.86 t ha^{-1} for barley (control 0.61), and 1.73 t ha^{-1} for maize (control 0.77). The net benefit was significantly higher on terraced fields, recording US\$ 20.9 (US\$ -12 control) for teff, US\$ 185 (US\$ -41 control) for barley and US\$ -34.5 (US\$ -101 control) $\text{ha}^{-1} \text{ yr}^{-1}$ for maize. The returns on family labour were 2.33 for barley, 1.01 for teff, and 0.739 US\$ per person-day for maize grown on terraced plots, compared to US\$ 0.44, 0.27 and 0.16 per person-day for plots without terraces, respectively. Using a discount rate of 10%, the average net present value (NPV) of barley production with terrace was found to be about US\$ 1542 over a period of 50 years. In addition, the average financial internal rate of return (FIRR) was 301%. Other long-term impacts of terracing included farmers' growing of maize on terraced fields as a result of water conservation. Currently, farmers also grow barley on terraced fields for two crop seasons per year unlike the experiences on farms without terraces. Household incomes and food security had improved and soil erosion drastically reduced. Many farmers had adopted terracing doubling the original area under the soil conservation pilot project and consequently improving environmental conservation in the watershed.