

Measuring Impacts of Agroforestry on Soil Erosion with Field Devices: Quantifying Potential for Water Infiltration, Soil Conservation, and Payments for Ecosystems Services Schemes

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Abstract : Throughout the second half of the 20th Century, estimates indicate that soil losses due to erosion have impacted one-third of worldwide arable lands. As such, these losses are amongst the largest threats to agriculture sustainability and production potential. Increasing tree cover is considered one of the most efficient methods to mitigate this phenomenon. The present study describes soil erosion measurements in different land cover situations in Alto Huayabamba, Peru, using the experimental plot methodology. Three parcels were studied during a one-year period (starting September 2015) with 3 different land cover scenarii evaluated: 10-year-old secondary tropical forest (P1), 3-year-old native species reforestation (P2) and bare soil (P3). Information was collected systematically after each rain to assess the average rainfall, water runoff and soil eroded. The results indicate that variance in land cover has a strong impact on the level of soil erosion. In our study, it was found that P1, P2 and P3 had erosion rates of 92 kg/ha/yr, 11 tons/ha/yr and 59,7 tons/ha/year respectively. Using a replacement cost method, the potential of limiting erosion by reforesting bare soil was estimated to be 561 \$/ha/yr after three years and 687 \$/ha/yr after ten years. Finally, the results of the study allow us to assess the potential soil services provided by vegetation, which could be an important building block for a payment for ecosystems services (PES) scheme. The latter has been increasingly spread all over the world through Public-Private Partnerships (PPP).

Keywords : agroforestry, erosion, ecosystem services, payment for ecosystem services (PES), water conservation, public private partnership (PPP)

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