

Soil and Water Conservation Strategies for the Tank Cascade Systems in the Dry Zone of Sri Lanka

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Tank cascade systems (TCSs) in the dry zone have played a vital role in water resources and agricultural sustainability for centuries in Sri Lanka. However, in recent times, soil erosion and sedimentation have posed a significant threat to this system due to inappropriate land use practices. This study focuses on the Yakandagaswewa sub-watershed within the Palugaswewa TCS in the Anuradhapura District, aiming to identify the primary contributors to soil erosion and propose conservation measures. The Revised Universal Soil Loss Equation (RUSLE) model, integrated with ArcGIS 10.8, was utilized to assess soil erosion patterns. The sediment delivery ratio was estimated using an accepted method proposed in the literature. A detailed slope map was generated to facilitate the development of conservation plans. Yakandagaswewa has a watershed area of 1.73 km², where factors like rainfall, slope, and soil type exhibit minimal variation, while vegetation emerges as the primary determinant of soil erosion. The watershed exhibited a potential annual sediment yield of 6203.5 t/ha. *Chena* (a seasonal highland crop cultivation area) contributes 50% to the total soil loss, while homesteads account for 20%. Other land use types, including forest, scrub, and paddy, also play a role in soil erosion dynamics, but to a lesser extent. Soil cover and land management, such as cover cropping and contour bunding, can be introduced to reduce soil erosion in these areas. A comprehensive sediment control plan must be implemented across the entire watershed area. This includes establishing a surface water drainage system with grassed waterways, installing sediment traps in all streams carrying runoff to the tanks just before they enter, regularly removing accumulated sediments, and maintaining a grass filter and tree belt around the tanks to directly trap any sediments flowing towards them.

Keywords: Conservation measures, RUSLE, Soil erosion and Sedimentation, Tank cascade systems