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Direct impacts of landslides on sustainable agroforestry system: A case study from Aranayake, Sri Lanka

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Landslides cause a wide range of impacts on socio-economic systems of the affected communities worldwide. However, general observations on the affected socio-economic systems are not adequate for prediction and decision making for landslide recovery. This study aims to estimate the direct impacts of a massive landslide that occurred around the sustainable agroforestry system in Aranayake, Sri Lanka. For this study, primary data was gathered using a structured questionnaire (127) from directly affected regions while combining them with spatial data to acquire detailed information on livelihoods and hazards at household level. Satellite images were used to demarcate landslide boundary, to acquire information on land-use and households prior to the landslide. Further, secondary data were obtained to assess the recovery cost. Considering affected land extent of the agroforestry system and its age as independent variables, a multiple regression model was established to estimate the economic value of the home gardens. Results revealed that 36% of the household income was generated by the agroforestry based home gardens and that the income level was highly dependent on the extent of the home garden ($R^2 = 0.85$, $p < 0.05$). According to established multiple regression model, economic value of the home garden is given by $Y; Y = 2196 + 10.51X_1 + 20.84X_2$ (X_1 , area in m^2 and X_2 age of home garden in years). Thus, the estimated economic value for the entire extent of the home gardens in the region accounted to \$ 4,927. Further, it was found that the landslide affected region has been contributing approximately \$ 200,000 annually from home gardens and plantations towards the GDP of the country. However, only \$ 40,369 has been allocated for the recovery and to restore the socio-economic system of the affected community. Landslides have a significant impact on agriculture based rural community because home gardens are their main income source. Combination of spatial data and tabular data provide a strong foundation for loss estimation due to landslides.

Keywords: Socio-economic system, landslide, direct loss of the landslide, spatial data, recovery.

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