

Impact Assessment of Clear-Cutting in a Pinus Plantation in the Nonpareil Area of Belihuloya, Sri Lanka

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Clear-cutting can be recognized as an economical way of timber harvesting in terms of profit and time-saving. Simultaneously, the rapid change within any ecosystem caused by the removal of entire vegetation causes serious environmental problems. Thus, the study was carried out to determine the key consequences of a post-clearcutting scenario (on aspects such as regeneration, soil erosion, and carbon storage). The study area, “Perawaththa Pinus Plantation”, underwent a clear-cut during the period from 2014 to 2016. The study area is a sloppy land in the Nonpareil area in Belihuloya within the Mid country, the Southern Intermediate zone of Sri Lanka. After the clear-cutting, the Forest Department has planted native plant species together with an exotic Eucalyptus sp. with the intention of converting the needle-leaf Pinus plantation forest into a broadleaf forest. However, the study found that the natural regeneration of the exotic Pinus caribaea (as the original stand) outperformed the supported attempt at restoring native broadleaf species, resulting in P. caribaea dominating the area (90% of regenerating plants) after five years of clear-cutting. The growth rate of P. caribaea was calculated as 1.68cm in diameter per year based on the DBH increment. Plot data represents 15 plant species regenerating in the area after the clear-cut belonging to 10 plant families, representing eight introduced species (incl. Eucalyptus sp.) and seven species that are regenerating naturally (incl. P. caribaea). The mean annual soil erosion was calculated by employing the InVEST SDR model, and it has increased from 3.1 tons·ha⁻¹·yr⁻¹ to 423.8 tons·ha⁻¹·yr⁻¹ in the post clear-cut scenario. The mean value of carbon storage, determined using the InVEST carbon model, also changed dramatically from 253.7 tons·ha⁻¹ to 27 tons·ha⁻¹, respectively, between the years 2013 and 2017. The findings of the study provide on-the-ground impacts of clear-cutting, which should be validated with multiple sampling sites and used for decision and policy-making in forest plantation management.

Keywords: Clear-cutting, InVEST Carbon, InVEST SDR, Nonpareil, Regeneration, Soil Erosion