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Unprotected Coastal Shrub Vegetation in the Eastern Coast of Sri Lanka: Impacts of Anthropogenic Disturbances and Predicted Sea Level Rise

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Abstract

A resilient coastal shrubland along the eastern coast of Sri Lanka remains unprotected due to human disturbance and jurisdictional gaps. This vegetation type was mislabeled as “bare land” by the Land Use Planning Department. It is vulnerable to human disturbance and sea-level rise. This study establishes a baseline to characterize vegetation dynamics and assess anthropogenic disturbances and rising seas. The study covered Batticaloa District. The vegetation was identified through ground-truthing and supervised classification, then mapped using GPS and GIS. 104 belt transects (10 m wide) were sampled at one-kilometer intervals, perpendicular to the coastline, lengths varied from 450 m to 4,750 m. Transect was divided into 50x50 m blocks, recorded: species composition, patch height, diameter, disturbance, and soil pH, EC, and salinity. GPS coordinates were logged at each sampling point. Across 71 study sites, 2,818.91 ha of coastal shrub vegetation was identified, supporting 1,849 types of patches. It is dominated by highly branched woody perennials that form clumped patches, with a mean height and diameter of 1.5m and 5m respectively. The vegetation is developing at a mean distance of 645 m from the high tide. Its distribution is constrained by soil pH, EC and salinity. Growth is limited when values exceed pH 8.18, EC 6.81 mS/cm, and salinity 3.26 ppt. The favorable ranges for survival are pH 3.85-8.18, EC 0.00-6.81 mS/cm, and salinity 0.0-3.26 ppt. Human disturbance was observed at all sites, averaging 61% per block. A projected 1 m rise in sea level is expected to push the vegetation landward by 45 m. This shift would result in the loss of 107 ha (4%) of shrubland across 34 sites (48%). Human disturbance and predicted sea-level rise threaten this century-old ecosystem. Given its ecological importance, urgent conservation measures and sustainable resource guidelines through stakeholder participation are essential.

Keywords: *Sea-level, Coastal, Vegetation, Disturbance*