

Evaluating Amphibian Diversity as a Measure of Ecosystem Development in Five Seral Stages of Belipola Analog Forest, Sri Lanka

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Amphibians serve as vital bioindicators of environmental health due to their sensitivity to habitat changes. Forest degradation threatens their habitats, but analog forestry an ecosystem restoration method can both restore habitats and provide economic benefits while conserving amphibians and other biodiversity. This study explores amphibian diversity across five seral stages in the Belipola Arboretum, the first analog forest in Sri Lanka's Central Highlands. The seral stages, based on stratification and cover, include early, mid, and late stages of ecological succession. Using the Visual Encounter Survey method, 120 amphibians from 13 species across four families were recorded. Data analysis with SAS tools showed that 85% of species were endemic, and 46% were threatened (Critically Endangered, Endangered, or Vulnerable). Statistical analysis revealed no significant differences in biodiversity between the early stages (p-values: first vs. second = 0.1478, second vs. third = 0.0678, third vs. fourth = 0.2055, fourth vs. fifth = 0.0609). However, significant differences were found between other stages. The highest Shannon-Wiener index, indicating greater biodiversity, was in the fifth seral stage (1.82), followed by the fourth (1.31), third (0.98), second (0.49), and first (0.11) stages. These results show that amphibian biodiversity increases significantly after the second seral stage, with habitat quality improving as succession progresses. This suggests that analog forestry, which mimics natural forest structures, enhances habitat quality and supports biodiversity conservation. As ecological succession advances, habitat quality for threatened amphibians improves, highlighting the value of maintaining and restoring diverse ecosystems. The study supports analog forestry as an effective approach for promoting ecological health and biodiversity in forested landscapes.

Keywords: Amphibian Biodiversity, Biodiversity Assessment, Conservation Management, Habitat Restoration

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