Can Diversity Indices Reflect the Forest Degradation Status? A Case Study of Hurulu Dry Forest Sri Lanka

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The degree of dry forest degradation due to anthropogenic disturbance is not yet quantified and this impedes forest restoration interventions and conservation in Sri Lanka. This study investigates selected diversity indices in response to anthropogenic disturbance to assess the severity of disturbance in the Hurulu forest reserve. Three different disturbance regimes (Un-Disturbed [UD], Moderately-Disturbed [MD] and Highly-Disturbed [HD]) were considered based on previous maps of the forest reserve and by conducting a reconnaissance survey. Sixty randomly selected plots (10 m X 20 m) were placed in the above disturbance regimes. In sampling plots, all living trees >1 cm was identified and enumerated by species. Tree species diversity was measured as different diversity and evenness indices such as Shannon's, Simpson's, Berger (reciprocal Berger-Parker diversity), Pielou's evenness and Simpson's evenness index. These indices were transformed to log and compared using one-way ANOVA. There were significant differences among disturbance groups regarding all the indices ($P<0.05$) excluding Pielou's evenness index ($P>0.05$). Significantly high mean Berger diversity index value ($P<0.05$) was observed at UD (3.70±0.01) and lowest at the more disturbed forests, i.e., MD (2.63±0.03) and HD (2.43±0.04). Though mean Shannon and Simpson diversity indices for UD showed significant differences ($P<0.05$) with HD, they did not show such differences with MD. Mean Simpson's evenness index for UD showed no significant differences ($P>0.05$) with HD forest. Though mean Shannon and Simpson diversity indices for UD showed significant differences ($P<0.05$) with HD, but not showed such differences with MD. Mean Simpson's evenness index for UD showed no significant differences ($P>0.05$) with HD. Though Shannon and Simpson diversity indices are sensitive to high disturbance, best diversity indices to explain differences between Un-disturbed and disturbed forests were Berger diversity index showing its highest value and high sensitivity in those dry forest which are in an undisturbed condition.

Key words: Forest degradation, Anthropogenic disturbance, Dry forest