Forest dieback in Horton Plains National Park

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Horton Plains National Park is a protected area in the central highlands of Sri Lanka and is covered by montane cloud forests and grasslands. Forest dieback was first reported four decades ago, and still continues to deplete forest cover in the park. A study on forest dieback in the upper montane rain forest of Horton Plains was initiated by the Department of Wildlife Conservation during 1997-1999 to determine the status of dieback, species affected and its distribution pattern. The second phase of this project was carried out in 2005.

During the 2005 study, data were collected from three forest sites in the park which were selected visually depending on the degree of dieback. The selected sites were Thotupolakanda (severe dieback site), Anderson 1 (moderately dieback site) and Anderson 2 (comparatively healthy site). Each site was subdivided into 25 sampling plots and every individual tree in the sampling plots was examined to record tree health conditions. Graphical techniques (pie charts and bar charts) were used to illustrate qualitative variables such as species, stratum, percentage of bark damage, percentage of stem defects, healthy tree and site. The results show that \textit{Cinnamomum ovalifolium} is the most abundant tree species in the park and \textit{Pittosporum tetraperum} and \textit{Ilex zeylanica} are the least abundant species. The percentage of sub-canopy trees in the Horton Plains is more than 75% and there are about 22% of canopy trees. Also, most of the trees in the park area were not subjected to bark damage and there are only 0.63% of trees which carry signs of more than 75% bark damage. The largest bark damage category was between 1-25% of damage. The magnitude of stem defect is similar to the magnitude of bark damage. Box plots were used to illustrate the pattern of distribution of quantitative variables such as Diameter at Breast Height (DBH), percentage of crown dieback, percentage of discolouration of foliage, percentage of defoliation and number of dead branches. It was found that the average DBH is around 9.96 cm and the average percentage of crown dieback of trees in the study plots is about 10.89%. Most of the trees have undergone 0-5% foliage discolouration and the mean percentage of discolouration of foliage of trees is about 4.08%. The highest percentage of healthy trees was recorded from Anderson 2 site and the lowest percentage of healthy trees was recorded from Thotupolakanda site. The proportion of unhealthy trees in Horton Plains is significantly greater than the proportion of healthy trees at 5% significance level. It was identified that there is a significant ($p=0.05$) difference among the diversity indices of the three sites. Moreover, distribution of proportional abundance of tree species in all three sites fits into a truncated log normal model at 1% significance level. Also, significant relationships exist between species and variables such as stratum, tree stature, percentage of bark damage and percentage of stem defect. Further, there is a moderate positive relationship between bark damage and stem defect at 5% significance level. The fitted ordinal logistic regression model can be used to predict the probability of percentage of a tree to undergo dieback when species, stratum, DBH and site are given.