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Assessment of the potential distribution areas for two endemic plant species of Sri Lanka under climate change by species distribution modelling

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Climate Change is arising as a major threat on biodiversity. Long term climatic conditions have direct links with the occurrence or prevalence of a species in a particular locality. Early predictions facilitate making necessary management options to reduce the negative impacts of this phenomenon. *Calophyllum walkeri* is a severely affected species from the dieback. It has a conservation status as vulnerable. *Syzygium rotundifolium* is a range restricted species. Both are endemic to Sri Lanka and dominant species in montane forests. The objective of this study was to predict the best suitable areas for both species currently and by 2070. Maximum Entropy (MaxEnt) modelling method was used, due to its accuracy and well performance even with small sample sizes as the number of records for *Calophyllum walkeri* was very low. Secondarily obtained data from the National Herbarium for the whole country were used for *Calophyllum walkeri* (n=29) and primarily obtained presence only data by field surveys covering the whole study area namely Horton Plains National park along with secondary data for less accessible places for *Syzygium rotundifolium* were used as species occurrence data (n=55). Climate data were obtained through the databases of WorldClim website which contains climate data as spatial data with high resolution, specifically have been developed for spatial modelling activities. Average monthly weather data for 2010-2018 with 2.5 minutes spatial resolution were used as current climate data and future climate data for 2070 for *MIROC6,* Global Circulation Model climate projection with 30s spatial resolution were used as future climate data. All the cllimate data were converted into *ascii* format by using ArcMap 10.2.2 and occurrence data were converted into *csv* format and introduced into the model while selecting random test percentage as 25%. Nuwara Eliya district along with some parts of Kandy and Matale districts were resulted as the best areas for *Calophyllum walkeri* currently, while Ratnapura and Kegalle districts show moderate suitability. There is a possibility in reduction of suitability in Kandy and Matale districts in 2070 while Nuwara Eliya district will remain as the best area. There is a possibility of wet zone of the country to become suitable for *Calophyllum walkeri* including Batayaya, Denuwakanda, Dolekanda. For *Syzygium rotundifolium,* Nuwara Eliya district was the best suitable area and Ratnapura district indicated slight suitability under both current and future climate conditions. The resulting value for the Area Under Curve test which is a main statistical test of this modelling method for *Calophyllum walkeri* was 0.947 and it was 0.968 for *Syzygium rotundifolium*. Since these values are greater than 0.5, the models have performed accurately. This study recommends further studies to check the possibility of the wet zone of the country including Western and Southern regions which was resulted as a suitable region with the changing climate, to introduce *Calophyllum walkeri* in a requirement to take more conservation efforts. Conservation efforts for *Syzygium rotundifolium* can be increased within the montane region, since it is the most suitable area for it, according to the results of this study.

Keywords: *Calophyllum walkeri*, Climate change, Maximum Entropy, *Syzygium rotundifolium*