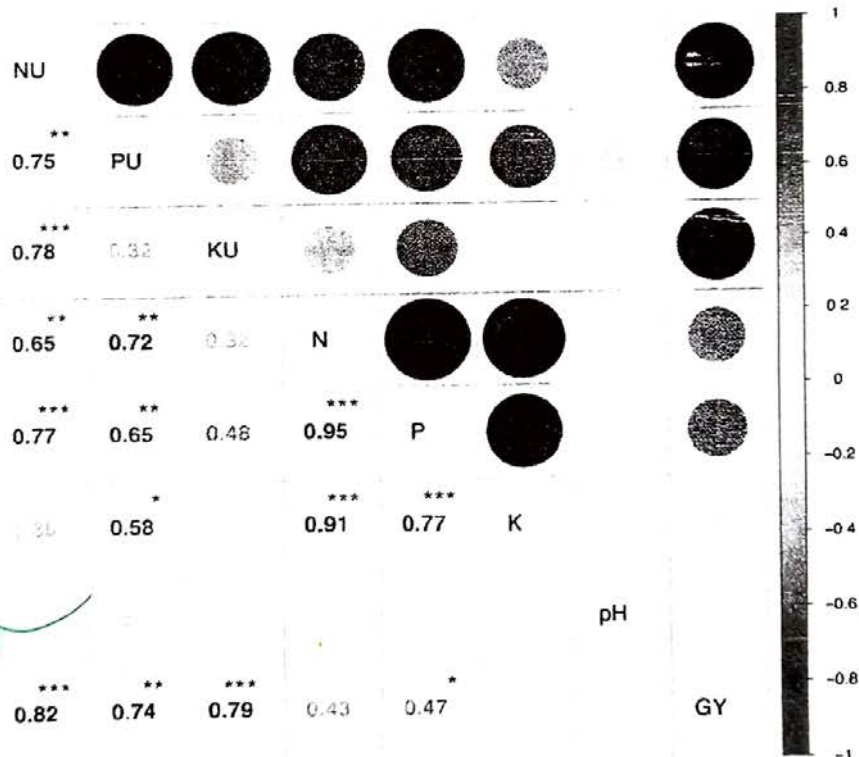


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FRAGMENTATION CAUSES WOODY PLANT COMPOSITION DECLINE IN SACRED GROVE PATCHES IN THE PUDUCHERRY REGION OF SOUTHEAST INDIA

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Abstract. The fragmentation of tropical forests threatens plant community compositions worldwide. In the present study, we examined the impact of fragmentation on plant community compositions over 40 years in sacred forest grove fragments in southern India. For this study, we randomly selected 30 sacred grove patches (hereafter referred to as fragments) of different sizes to examine the effects of fragment size and historical changes on the plant community compositions. A total of 414 woody plant individuals consisting of 53 species belonging to 45 genera and 20 families were recorded from the 30 sites. The total area of the fragments was not significantly related to the current species richness or diversity, although there were significant negative relationships between the total fragment size and the species composition and between the total fragment size and the species evenness, indicating that fragmentation negatively impacted woody plant compositions. Interestingly, our results showed that the woody tree abundance was significantly and positively related to the total fragment size, suggesting a potential increase in recruitment due to the various forms of ongoing human disturbances. Moreover, the woody plant species compositions may be declining in these venerated forest patches due to the removal of plant resources, potentially resulting in declining fragment sizes.

Key Words: *Abundance, Coromandel Coast, disturbance, diversity, species-area relationship*

Introduction

Sacred groves are holy places where local people maintain tropical dry evergreen forest patches (TDEFs) due to the many resident tree species considered to be sacred (Ramanujam and Kadamban 2001, Kent, 2013; Pradhan et al., 2019). The majority of sacred groves are forest patches of different sizes and shapes created through previous human disturbances and forest fragmentation. Human-induced fragmentation and land use changes significantly alter forest tree species richness and compositions worldwide (Haddad et al., 2015, Wilson et al., 2016, Zhao et al., 2019). Fragmentation has been shown to impact species diversity and composition both positively and negatively, although the negative responses are much more prevalent (Urban and Keitt, 2001, Haila 2002, Ethier and Fahrig, 2011, Smith et al., 2011, Munguia-Rosas and Montiel, 2014, Mohandass et al., 2018). Fragmentation is a multidimensional process because it can influence numerous patch metrics, such as patch area, shape and isolation. A decrease in patch area may result in a decrease in the amount of available habitat (Laurance et al., 2007). Moreover, a decrease in the area of a fragment may result in a decrease in the amount of forest interior relative to the edges, possibly resulting in a loss of species given that forest interiors are more similar to prefragmentation conditions than forest edges (Petit et al., 2004). Moreover, human-induced fragmentation may result in both direct and indirect