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| **A Comparison of Tree Species Diversity among Montane Forest Fragments in the Taita Hills of Kenya using Hyperspectral Remote Sensing** |
| The fragmentation of forests into disconnected fragments in human-modified landscapes causes changes in the arrangement of plant communities and is considered a significant global threat to biodiversity. The tropical montane forests of the Eastern Arc Mountains in East Africa are a global biodiversity hotspot, hosting an exceptionally diverse range of organisms. However, due to agricultural expansion, these rainforests have been fragmented into isolated forest fragments, and the remaining forests have suffered from selective logging and the planting of exotic tree species. The biodiversity of such forest fragments can be examined at two levels: the diversity within the forests (α-diversity) and the diversity among the forests (β-diversity). Hyperspectral remote sensing offers a way to study both α- and β-diversity by using spectral diversity as a proxy for species diversity, a concept known as spectral species. Yet, the biodiversity of the East African montane forest fragments remains understudied, with no prior studies of their β-diversity.  We mapped and compared the tree species richness in montane forests of the Taita Hills in Kenya using AisaKestrel10 airborne hyperspectral data in the spectral range of 400-1000nm and a spatial resolution of 70cm. First, we calculated a minimum noise fraction (MNF) transformation to reduce the noise and dimensionality of the data. Then, we segmented the transformed data based on pixel similarity and distance using an extended version of the Simple Linear Iterative Clustering (SLIC) algorithm. After this, we calculated average MNF values for the crowns and classified them into spectral species using unsupervised K-means clustering. To calibrate the parameters of the clustering and to validate the classification, we used a set of 0.1ha field plots, where the number of tree species had been identified. Finally, we used the resulting spectral species maps to explore the α- and β-diversity. The results reveal how tree species diversity varies within and among these montane forest fragments, providing valuable information to guide conservation and reforestation efforts. |