

# A Novel Methodology for Co-Clustering Identification and Analysis for Endemic Plants with Applications to Conservation and Agricultural Planning

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Biodiversity is very important for environmental health since it adds to genetic variability, preventing soil erosion, and discovering new resources. Endemic plants add to the biodiversity of their respective ecosystems; therefore, by analyzing the distributions of multiple endemic flora, it is possible to identify biodiverse hotspots. Since previous studies in this field are only useful to locate broad endemic hotspots, this study aims to create a method that will allow other scientists/policy-makers to pinpoint a much more precise region to make their efforts of conservation more efficient. This research uses the spatial relationships between 15 endemic wetland plant species to determine if each species distributed deterministically, if multiple species co-clustered together, and if human expansion was threatening their habitats. Using Google Earth, every specimen was georeferenced and their coordinates determined. By inputting certain parameters on platforms like ArcGIS and SYSTAT, many analyses were conducted including a Hotspot Analysis, Average Nearest Neighbor Summary, Convex Hull Analysis, Hierarchical Cluster Diagram. The analyses conducted proved that the clustering was statistically significant and irrefutably deterministic and, within the same physiographic regions, the distributions of multiple species were seen overlapping together in endemic plant foci. A human expansion analysis that was also conducted showed that expansion was beginning to encroach on the habitats of these endemics, putting them in harm's way. The conclusions reached in this investigation provides much better guidelines for politicians/scientists to prioritize their conservation efforts effectively by looking at how multiple species cluster together within their natural habitats.

## Awards Won:

American Statistical Association: Certificate of Honorable Mention