

Use of Spectral Signature Characteristics to Differentiate Mangrove Species

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Mangroves are woody, highly specialized plants ranging from shrubs to tall trees which play a major role in environmental protection in coastal ecosystems. Past studies reveal that spectral characteristics of plants at different wavelengths are characterized by their biochemical (carotenoid, water content, chlorophyll, nitrogen) and anatomical (leaf inter and intra cellular structure) variations. This research aims at finding spectral signatures of six selected mangrove species in Sri Lanka, namely; *Acanthus ilicifolius*, *Bruguiera gymnorhiza*, *Bruguiera sexangula*, *Lumnitzera racemosa*, *Rhizophora* and *Sonneratia caseolaris*. A hand held Spectroradiometer which is in the range of 320 - 1100 nm (1 nm bandwidth) was used to collect the spectral signature measurements. Ten measurements were taken from each mangrove species followed by a reference measurement, under ambient light, temperature and other environmental conditions. Erroneous data as well as experimental errors were eliminated in all the spectral reflectance curves. Eleven vegetation indices; blue green pigment index (BGI), blue red pigment index (BRI), greenness index (GI), greenness vegetation index (GV), curvature index (LIC), carotenoid reflectance index (CRI), modified chlorophyll absorption ratio index (MCAR), modified vegetation stress ratio (MVSr), normalized pigment chlorophyll index (NPCi), photochemical reflectance index (PRI) and simple ratio (SR4) were selected and calculated. Average of each vegetation index for each mangrove species were obtained and t-tests were performed. Out of the studied indices, four vegetation indices; GVI, MVSr, PRI and BGI can be effectively used to differentiate the six mangrove species as they were statistically highly significant with p-value less than 0.0001. Moreover, the study reveals that the reflectance wavelength region of 450 - 720 nm can be used to separate the six mangrove species effectively.

Keywords: Mangrove, Spectral signatures, Vegetation index, Spectroradiometer