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Integration of multispectral satellite and hyperspectral field data for aquatic macrophyte studies

C. M. John¹ and N. Kavya^{1,2}

¹Dr. R. Satheesh Centre for Remote Sensing and GIS, School of Environmental Sciences, Mahatma Gandhi University, Kottayam, Kerala, 686560, India

²Indian Institute of Information Technology and Management-Kerala, Thiruvananthapuram 699581, India

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Abstract. Aquatic macrophytes (AM) can serve as useful indicators of water pollution along the littoral zones. The spectral signatures of various AM were investigated to determine whether species could be discriminated by remote sensing. In this study the spectral readings of different AM communities identified were done using the ASD Fieldspec® Hand Held spectro-radiometer in the wavelength range of 325–1075 nm. The collected specific reflectance spectra were applied to space borne multi-spectral remote sensing data from Worldview-2, acquired on 26th March 2011. The dimensionality reduction of the spectro-radiometric data was done using the technique principal components analysis (PCA). Out of the different PCA axes generated, 93.472 % variance of the spectra was explained by the first axis. The spectral derivative analysis was done to identify the wavelength where the greatest difference in reflectance is shown. The identified wavelengths are 510, 690, 720, 756, 806, 885, 907 and 923 nm. The output of PCA and derivative analysis were applied to Worldview-2 satellite data for spectral subsetting. The unsupervised classification was used to effectively classify the AM species using the different spectral subsets. The accuracy assessment of the results of the unsupervised classification and their comparison were done. The overall accuracy of the result of unsupervised classification using the band combinations Red-Edge, Green, Coastal blue & Red-edge, Yellow, Blue is 100%. The band combinations NIR-1, Green, Coastal blue & NIR-1, Yellow, Blue yielded an accuracy of 82.35 %. The existing vegetation indices and new hyper-spectral indices for the different type of AM communities were computed. Overall, results of this study suggest that high spectral and spatial resolution images provide useful information for natural resource managers especially with regard to the location identification and distribution mapping of macrophyte species and their communities.

[Conference Paper](#) (PDF, 3384 KB)

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