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ESTIMATION OF MANGROVE FRACTIONAL COVER USING MIXTURE TUNED MATCHED FILTERING OF LANDSAT IMAGE

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ABSTRACT:

Mangroves are an important part of the coastal ecosystem. They provide ecological services and serves as protection against strong waves and coastal erosion. Continued monitoring of mangroves is essential as these coastal habitats are continually subjected to threats coming from anthropogenic activities. While numerous high-resolution images are available, these typically do not come for free. On the other hand, Landsat images remains available for all to use and their availability is increasing making it ideal for monitoring environmental features. Many research have dealt with mapping mangroves using crisp classification. However, it is possible to estimate abundance or fractional cover of mangroves and these would provide more useful information for monitoring and conservation purposes. A Landsat 8 image of Puerto Princesa City (Palawan, Philippines) was first atmospherically corrected using FLAASH implemented in ENVI. Minimum Noise Fraction (MNF) was then run. The Mixture Tuned Matched Filtering (MTMF) algorithm was then applied to these MNF images to yield two images, namely MTMF score and Infeasibility for the mangrove endmember. Selection of endmember pixels was based on the three methods: contrast stretching of image bands, maximum NDVI values, and pixel purity index (PPI). It was noted that these methods yield similar set of endmember pixels. Mangrove pixels are those with relatively high MTMF score and relatively low Infeasibility. The selection of mangrove pixels based on these criteria was carried out by examining the scatterplot of MTMF score and Infeasibility. This yielded the equation of a line that can be used to separate mangrove from non-mangrove pixels. Contextual editing was implemented to remove pixels which are far from the coast or river banks. The MTMF score of identified mangrove pixels can be considered initial estimates of the fractional cover of mangroves within a Landsat pixel. Mangrove cover in 30m x 30m grid cells was estimated using Google Earth images. Results indicate that a regression equation involving the MTMF score can yield reliable estimate of fractional cover.

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