

CLASSIFICATION OF MANGROVE FOREST USING THE VEGETATION  
INDEX

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**CLASSIFICATION OF MANGROVE FOREST USING THE VEGETATION  
INDEX**

**DEDICATION**

THIS WORK IS SPECIALLY DEDICATED TO MY FATHER AND MOTHER,  
DINDA AHMAD AND JAWAH BAHAN, BROTHERS AND SISTERS FOR  
THEIR LOVE AND SUPPORT AT ALL TIMES. A SPECIAL DEDICATION  
ALSO TO BELOVED WIFE, BHARUHL SUHAFLA ISMAIL FOR HER  
KINDNESS, PATIENCE AND ENCOURAGEMENT.

**By**

**MOHD. SUFFIAN BIN IDRIS**

**Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia,  
in Fulfillment of the Partial Requirement for the Degree of Master of Science**

**January 2002**

Universiti Teknologi Malaysia  
Faculty of Science

**CHANGING VEGETATION PATTERNS USING THE VEGETATION INDEX**

**DEDICATION**

**THIS WORK IS SPECIALLY DEDICATED TO MY FATHER AND MOTHER, IDRIS AHMAD AND JAUYAH HASAN, BROTHERS AND SISTERS FOR THEIR LOVE AND SUPPORT AT ALL TIMES. A SPECIAL DEDICATION ALSO TO BELOVED WIFE, SHAHARUL SUHAILA ISMAIL FOR HER KINDNESS, PATIENCE AND ENCOURAGEMENT.**

Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfillment  
of the requirement for the degree of Master of Science

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Chairman : Mr. Sulong Bin Ibrahim

Faculty : Science and Technology

The basic premise of this study is based on the fact that the spectral response of leaf and canopy can provide information about the biophysical properties of vegetation to assist the differentiation and consequently mapping of the forest type. Hence, the canopy spectral response and the capabilities of various vegetation indices for vegetation mapping in Chukai, Terengganu and Pekan, Pahang were examined. Three sites that stretched along the coastal area between Chukai and Pekan that represented a large scale of mangrove areas were studied.

Spectral characteristic for dominant vegetation species and the background soil were measured "in-situ" using hand-held radiometer. Fourteen existing vegetation indices which were based on the band ratios, soil-related and atmospherically corrected indices were used for the mapping of the different classes of mangrove vegetation. Reference data were developed using ground sampling and interpretation of 1:5,000 aerial photographs. The unsupervised classification and accuracy assessment were done based on the number of classes for each site.

The results obtained revealed that leaf reflectance of most mangrove vegetation species were well differentiated especially in red and NIR bands. However, the spectral response of leaf scale varied between the study areas. It was observed that the reflectance was higher in the NIR but low in the red band, but was opposite for soil reflectance. The low reflectance for soil could be related to the moist soil condition at most sites.

All indices used in this study did not improve the classification accuracy where the accuracy was not more than 72% in all sites. With exception of MSAVI2 index, the accuracy obtained were low in all study areas as compared to the conventional classification technique. Accuracy ranged from 33% to 71% in Pulau Che Wan Dagang; 46% to 72% in Pulau Sekeping and 48% to 70% in Pulau Permatang Pauh. Meanwhile, the accuracy of conventional classification for Pulau Che Wan Dagang Pulau Sekeping and Pulau Permatang Pauh were 68, 72 and 73% respectively. The results also demonstrated that MSAVI2 was the most consistent index as it's value was comparable with the conventional classification. PVI and TSAVI were the most inconsistent indices because they lack of sensitivity to changes in species composition and background reflectance.

In qualitative assessment of vegetation indices, the sensitivity analysis over soil and red-NIR reflectances were evaluated. The results showed that all indices were not affected by soil reflectance in dense mangrove forests. ARVI, NDVI, OSAVI and RVI had a strong correlation trend with the red reflectance and considered as 'red dependent' indices. The DVI, GEMI, MSAVI, MSAVI2, PVI and WdVI were found to be sensitive to changes in NIR reflectance thus, not saturated as the NIR increased. Since all indices except MSAVI2 were inconsistent and gave low accuracy, examination did suggest that MSAVI2 was the most suitable for mapping of dense mangrove forest.