RELATIONSHIP BETWEEN VEGETATION INDICES AND DENDROMETRIC PARAMETERS IN KELANTAN DELTA MANGROVE ECOSYSTEM

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RELATIONSHIP BETWEEN VEGETATION INDICES AND DENDROMETRIC PARAMETERS IN KELANTAN DELTA MANGROVE ECOSYSTEM

By

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LIST OF ABBREVIATIONS

ABBREVIATION	DESCRIPTION
ANOVA	Analysis of Variance
ASEAN	Association of Southeast Asian Nations
DN	Digital Number
FCC	False Color Composite
GIS	Geographical Information Systems
GPS	Global Positioning System
Ha	Hectares
Km	Kilometers
LUT	Look Up Table
MMS	Multi-Spectral Scanner System
NDVI	Normalised Different Vegetation Index
NIR	Near Infra Red
PCQM	Point Centred Quarter Method
RGB	Red, Green and Blue
RMS	Root Mean Square
RSO	Rectified Skew Orthomorphic
SA	Selective Availabality
SPOT	*Systeme Probatoire d'Observation de la Terra*
TM	Thematic Mapper

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ABSTRACT

Remote sensing is the modern technology to obtain useful information synoptically as it offers a complete coverage of the study area, complementing field surveys of higher information but which are difficult to carry out, especially in the case of mangroves. This project involves the implementation methodologies to analyze relationship between vegetation indices and dendrometric parameters in Kelantan Delta mangrove ecosystem. This study area consists of 17 islands, covering an area of approximately 1200 ha. The ground truth survey covered 21 sampling stations, of which 7 stations represented mangrove proper while others are rural settlement and terrestrial vegetation. For mangrove classification analysis, the satellite image (Landsat TM) acquired on year 2000 was used. This image was processed using ERDAS software with band combination 4, 5, 3. The land-use cover classification had 11 classes, and about 3 classes are exclusively for mangrove species such as *Rhizhopora*, *Avicennia* and *Sonneratia-Nypa*. The overall accuracy for supervised map of the study area is 80.85% and *kappa* index of 2000 image achieved in this study was 0.7551. The area statistics for mangrove forest for Kelantan Delta mangrove is 3.541 km^2, meanwhile for vegetation indices (e.g. NDVI) which derived from the same satellite image had 3 mangrove classes i.e., *Less Dense, Medium Dense* and *Dense* mangrove. The potential relationship between vegetation indices dendrometric parameters obtained from ground survey (e.g. density-stems/0.1 ha and basal area – m^2/0.1ha) was presented. The amount of vegetation seen by satellite sensor is coinciding with the amount of wood volume (basal area) estimated, and various statistical methods such as scatter-plots and analyses of variance (ANOVA) were applied to strengthen the findings.

ABSTRAK

Sistem Penderiaan Jarak Jauh merupakan satu teknologi yang moden bagi memperolehi informasi secara berguna dan memberikan liputan secara menyeluruh terhadap kawasan kajian dan pelengkap tinjauan kerja yang memerlukan informasi yang tinggi di mana ia sukar untuk dijalankan terutamanya di kawasan hutan paya bakau. Projek ini melibatkan implementasi metodologi Sistem Penderiaan Jarak Jauh dalam menganalisa hubungan di antara indeks tumbuh-tumbuhan dan parameter-parameter pokok di kawasan ekosistem hutan paya bakau di Delta Kelantan. Kawasan kajian meliputi 17 buah pulau dengan keseluruhan kawasan kira-kira 1200 hektar. Tinjauan kerja melibatkan 21 stesyen kajian, di mana daripada sejumlah 21 stesyen kajian hanya terdapt 7 sahaja kawasan yang mempunyai hutan paya bakau. Bagi klasifikasi analisis hutan paya bakau, imej satelit (Landsat TM) tahun 2000 telah digunakan. Imej ini telah diproses menggunakan perisisan ERDAS melalui kombinasi 'band' 4, 5, 3. Sebanyak 11 kelas kawasan yang telah dikenal pasti, di mana 3 kelas daripadanya merupakan hutan paya bakau di Delta Kelantan. Antaranya ialah *Rhizophora, Avicennia* dan *Sonneratia-Nypa.* Ketepatan peta yang diperolehi ialah 80.85%. Manakala bagi index *kappa* pula ialah 0.7551. Keluasan bagi hutan paya bakau di Delta Kelantan pula ialah 3.541 km^2. Sementara itu, index tumbuh-tumbuhan yang diperoleh dari imej satelit menunjukkan terdapat 3 kelas hutan paya bakau iaitu hutan paya bakau kurang padat, separuh padat dan padat. Potensi hubungan di antara indeks tumbuh-tumbuhan dan parameter-parameter pokok diperolehi dari tinjauan kerja yang dilakukan seperti yang telah dibentangkan. Kandungan tumbuh-tumbuhan yang dilihat melalui imej satelit mempunyai perkaitan yg tinggi yang melibatkan kandungan isipadu kayu berbanding dengan kepadatan pokok dengan menggunakan pelbagai kaedah statistik seperti taburan plot dan juga analisis varians (ANOVA).