

UNIVERSITI TEKNOLOGI MARA

DEVELOPMENT OF ALGORITHM
OF TIME AND SPACE DOMAIN FOR
CHLOROPHYLL-A (CHL-A) AND
TOTAL SUSPENDED SEDIMENT
(TSS) AT TELUK LIPAT
TERENGGANU COASTLINE

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ABSTRACT

Chlorophyll-a (Chl-a) and Total suspended sediment (TSS) is a water quality parameter that can be currently determined using remote sensing technology. Several algorithms that have been developed across different regions indicate that algorithms are highly regional dependent due to differences in the optical properties of suspended matter. However, the developed algorithms are highly regional dependence. In order to precisely estimate the TSS and Chl-a concentration, new algorithm need to develop. The objective of this study is to develop a regional Chl-a and TSS algorithms for Teluk Lipat, Malaysia by utilising Landsat 8 and in situ datasets. A first field trip was conducted in the study area on 28 March 2018, concurrent with the passing of Landsat 8. A total of 30 samples were collected during the trip. The samples were then analysed using an established lab method to determine Chl-a and TSS concentrations. The image acquired on 28 March 2018 was used. The images were the processed using Envi 5.1. The relationship between in situ TSS and Chl-a with remote sensing reflectance was identified using a regression analysis technique. The result shows that the Chl-a over the study area is highly correlate with Normalized Difference Water Index (NDWI), with $R^2 = 0.74$ and the result demonstrated that TSS in the study area is highly correlated with three Landsat 8 bands, namely, green, near-infrared and short-wavelength infrared, wavelength, with $R^2 = 0.79$. For validation analysis, a second field trip was conducted on 16 April 2019 concurrent with the Landsat 8 bypass. During this process, a total of 30 samples were collected during the trip. The samples were then analysed using an established lab method to determine Chl-a and TSS concentrations. The relationship between in situ Chl-a and TSS with the developed algorithm is then validated using regression analysis technique. This validation used only seven point due to the presence of clouds cover during the field trip. The result of validation shows for developed Chl-a was in high correlation with validation data with the value of $R^2 = 0.8289$ and the correlation of developed TSS algorithm and validation data is $R^2 = 0.8406$. The TSS and Chl-a map is then constructed using these developed algorithms. The investigation of the TSS and Chl-a distribution pattern shows that, high TSS concentration observed along the coastal line and the over the river mouth. Meanwhile the Chl-a distribution is scattered over the study area.

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