Study of Ocean Color Using Landsat ETM Satellite Imagery:Case Study of Mahakam Delta, East Kalimantan, Indonesia

Wiwin Ambarwulan, Aris Poniman,Suwahyuono
BAKOSURTANAL

w_ambarwulan@yahoo.com

Decreasing water quality is a main problem in Mahakam Delta, East Kalimantan, Indonesia. This water quality degradation in this site is especially due to the conversion of mangrove to fishpond culture. Monitoring of water quality is a necessity in order to handle many problems regarding water quality. A drawback of monitoring made by in-situ measurements is that, only limited number of sampling points could be realized. Utilization of satellite remotely sensed imagery offers the possibility to monitor in large regions and to study the entire ecosystem over space and time. Total suspended matter (TSM) concentration and chlorophyll are among the parameters that can be used to describe and monitor the dynamic of the water quality in such environmentThe main objectives of this research are to retrieve total suspended matter (TSM) concentration and chlorophyll concentration from Landsat ETM. The method used is an empirical approach, based on correlation between reflectance and in-situ measurement. The images used in this research are Landsat ETM of 27 February 1998 and Landsat ETM of 24 May 2003.In the TSM retrieval, the use of single band give the lower correlation, compared to the use of combination of two bands. Near infrared band give the lower correlation compared to visible band. The highest value of TSM is detected in the location of mangrove disturbance compared to the water near virgin forest. The TSM value obtained by algorithm applied in this research ranged between 0 to 60 mg/l.In chlorophyll retrieval, the reflectant obtained from Landsat TM/ETM in the visible band and their combination give the various value of correlation with chlorophyll concentration resulting from laboratory measurements. The reflectant of Band 2 and Band 3 give the highest correlation with in-situ chlorophyll concentration. These indicate that Band 2 and Band 3 of Landsat TM/ETM have a highest sensitivity to the chlorophyll. At that wavelength, absorption of electromagnetic wave is maximizing. Band 4 does not have the correlation with chlorophyll.This statistical approach gives range of various results. The high correlation occurred in this research will not usually give the same result when applied to the other area. Statistical approach will give a high response when field data is obtained at the same time with satellite overpass. Nevertheless, the statistical approach gives significant view of ocean color parameters in term of spatial distribution.