The effect of land reclamation on water clarity in Tanjung Tokong using remote sensing

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Field data (Secchi Disk Depth) of coastal water surrounding the reclaimed land located off the coast of Tanjung Tokong, Penang was taken on the same date as the overpass of Landsat 8 image on the 20th December 2017. Results from Secchi Disk readings show that, in general, the water clarity is worse near the reclaimed land when compared to protected areas, such as the National Park coastal area in northwest Penang. Furthermore, it was observed that Secchi depths become shallower to the northwest of the reclaimed land in comparison to the southern part. In order to estimate the Secchi Disk Depth using Landsat data, correlation between field data and satellite data was studied using linear regression approach. Correlation between ground data and atmospherically corrected satellite image for Band 5 (Near Infrared) was found to be the most robust with correlation coefficient close to one (R^2=0.7051). The selected linear regression model was then applied to estimate the Secchi Depth for the entire image and for archive Landsat 8 images of the study area. In addition, ocean bottom soil samples taken around the reclaimed land are of very fine and muddy nature, which was previously of a sandy nature; a healthy environment for crabs, molluscs and other organisms. Very fine sediments are in suspension in high energy environment resulting in lower water clarity and a decrease in light penetration. Although the degraded coastal water clarity of Tanjung Tokong suggests that the reclaimed land has an adverse effect on its water quality, important environmental factors, such as tides, waves and currents must be taken into account to fully understand their effects on coastal water clarity.

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