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# IMAGE-BASED ANALYSIS OF SEABED USING MBES BACKSCATTER DATA FOR DREDGING IMPACT ASSESSMENT

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**Thesis submitted to the Universiti Teknologi MARA Malaysia**
**in partial fulfilment for the award of the degree of the**
**Bachelor of Surveying Science and Geomatics (Honours)**

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## AUTHORS' DECLARATION

I declare that the work on this project/dissertation was carried out in accordance with the regulations of Universiti Teknologi MARA (UiTM). This project/dissertation is original, and it is the result of my work, unless otherwise indicated or acknowledged as referenced work.

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## ABSTRACT

This study explored the application of Object-Based Image Analysis (OBIA) on Multibeam Echo Sounder (MBES) backscatter data to determine the influence of dredging activities on seabed characteristics. The study used data from 2020 and 2021 to detect and explain changes in the physical characteristics of the bottom, offering insights into the consequences of dredging on marine habitats. The objectives of this research were to use OBIA to analyse seabed changes using MBES data, to determine the influence of dredging activities on seabed features by comparison analysis, and to apply OBIA methodologies to MBES backscatter data. The objective entailed processing and analysing MBES data from 2020 and 2021 to detect and characterise changes in the seabed's physical features. The study produced precise maps of bottom variations, showing changes in texture, composition, and topography caused by dredging activities. Comparative examination of the two years showed temporal changes, with particular modifications attributed to dredging interventions. The PCA generated four principal components, collectively accounting for 99.683% for 2020 and 98.802% for 2021 of the total variances. To validate these findings, signal based method which using the Angular Range Analysis (ARA) were used as a reference. result of accuracy assessment, based on the kappa coefficient, revealed that the sediment classification map created by combining bathymetry and the PCA determined derivative layers slightly outperformed the traditional method utilizing both bathymetry and backscatter data. These findings lead to a better understanding of how dredging activities affect the physical state of the bottom, providing useful information for marine conservation and policymaking. The study expanded on methodology and findings from previous research that indicated the usefulness of OBIA in maritime environments. By expanding these approaches to particularly focus on dredging consequences, the study filled a critical gap in marine environmental assessment and monitoring.



Keywords: OBIA, MBES, seabed, dredging, backscatter, marine, conservation, analysis, mapping, and monitoring

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