

ASSESSMENT OF TOTAL SUSPENDED SOLIDS (TSS) PATTERN
IN LANGKAWI USING GEOSPATIAL APPROACH

MUHAMMAD IHSAN BIN ZULKIFLI
2022864732



SCHOOL OF GEOMATICS SCIENCE AND NATURAL RESOURCES
COLLEGE OF BUILT ENVIRONMENT
UNIVERSITI TEKNOLOGI MARA MALAYSIA

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**MUHAMMAD IHSAN BIN ZULKIFLI
2022864732**



**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)**

JULY 2024

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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Name of Student : Muhammad Ihsan bin Zulkifli
Student's ID No : 2022864732
Project/Dissertation Title : Assessment of Total Suspended Solids (TSS) Pattern
in Langkawi using Geospatial Approach
Signature and Date :

Approved by:

I certify that I have examined the student's work and found that they are in accordance with the rules and regulations of the School and University and fulfils the requirements for the award of the degree of Bachelor of Surveying Science and Geomatics (Honours).

Name of Supervisor : Sr Gs Dr Fazly Amri bin Mohd
Signature and Date :

ABSTRACT

The assessment of Total Suspended Solids (TSS) patterns is of paramount importance in understanding and managing the environmental health of aquatic ecosystems. This research explores the application of remote sensing and Geographic Information Systems (GIS) in evaluating TSS patterns in Langkawi, Malaysia, a region known for its ecological significance and tourism appeal. Langkawi's diverse aquatic ecosystems, including rivers, lakes, and coastal waters, face increasing anthropogenic pressures due to rapid urbanization and tourism development. The objectives of this study are to identify the amount of TSS concentration in Langkawi Island and to compare the TSS pattern in different areas in Langkawi Island using Sentinel-2 imagery and in situ data measurement. The integration of field-based water quality measurements complements the remote sensing data, enhancing the accuracy and reliability of the assessment. Findings of the results highlighted TSS patterns in Kilim is higher compared to Pulau Tuba, reflecting distinct environmental dynamics and anthropogenic influences. Highest TSS value in Pulau Tuba is 37.85 mg/L, recorded in February 2023, while the lowest is 9.92 mg/L in October 2022, both at Station 4. Highest TSS value in Kilim is 53.17 mg/L, recorded in October 2022 at Station 2, while the lowest is 6.60 mg/L also in October 2022, at Station 5. The accuracy assessment using Normalized Mean Absolute Error (NMAE) formula shows that all stations are within the tolerance which are below 30%. The NMAE results indicated a high level of agreement between in-situ measurements and satellite-derived data, highlighting the effectiveness of Sentinel-2 in monitoring water quality dynamics over time. The objectives achieved successfully with the final output of TSS pattern maps are produced for both period (October 2022 and February 2023) in both locations (Pulau Tuba and Kilim). The outcomes hold significant implications for policy development, conservation efforts, and the preservation of Langkawi's unique and fragile aquatic ecosystems in the face of increasing environmental pressures.

Keywords: Water quality, Total Suspended Solids (TSS), Remote Sensing, Geographic Information Systems (GIS), Geospatial, Langkawi, Malaysia.

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