Satellite-Based Bathymetric Survey and Mapping Case Study of Dunga Beach in Lake Victoria

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SUMMARY

Accurate bathymetry survey and mapping are essential for understanding the topography

and morphology of underwater environments, aiding in key applications such as marine

navigation, habitat mapping, environmental monitoring and resource exploration.

Traditional methods for bathymetric mapping, such as sonar and lidar, remains very

important and reliable in terms of accuracy. However, they can be costly and time□consuming, especially for large and remote inaccessible areas.

Satellite-based bathymetric surveys have gained attention in recent years due to their cost□effectiveness and efficiency in estimating water depths. This method utilizes satellite

imagery to measure water's optical properties, particularly in shallow, clear waters.

However, accuracy remains a challenge. A study was carried out to compare satellite-based

bathymetric survey methods, focusing on their accuracy and reliability.

The study was conducted particularly to test remote sensing bathymetric modeling

algorithms using a case study of Dunga beach in Lake Victoria. Sonar bathymetry was

conducted to establish a search and rescue center by the Kenya Maritime Authority (KMA). The in-situ measurement data was used to train samples with the Lyzenga and Stumpf algorithms, demonstrating the reliability and practicability of large-scale bathymetric mapping.

The Lyzenga model outperforms the Stumpf model in a case study, demonstrating that satellite-based bathymetric data can provide reliable data for large-scale mapping at a lower cost and increased efficiency, making it a viable alternative for regions like Lake Victoria where traditional methods may be challenging due to budget and time constraints.