

## **An Analysis of Harbor Basin Bathymetry Using Satellite Imagery: A Case Study in Kirinda Fishery Harbor, Sri Lanka**

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Accurate bathymetric data involves mapping the depth and features of the underwater terrain. Further, bathymetric data can be revealed by effective harbor management, navigation, infrastructure planning, and dredging operations. Precise bathymetry is the basis of creating reliable nautical charts and ensuring safe navigation for vessels. The traditional sonar surveys have essential limitations, despite their effectiveness. Therefore, different methods such as satellite imagery are being used to make bathymetric data collection more effective and cost-effective, to address the limitations of traditional sonar surveys. In this study, at the harbor basin in Kirinda, the most advanced remote sensing techniques and image processing methods were implemented to generate a wide-ranging bathymetric map. The maps generated from remote sensing technology, made available insights into underwater topography, sediment distribution, and changes over time. The analysis of Landsat 8 satellite imagery data from 2012, 2014, and 2017 were used, and to confirm the accuracy of the satellite-derived bathymetry, sound-derived bathymetry data from 2012, 2014, and 2017 were also combined. The following changes of Kirinda Fishery Harbor have been observed, that are sediment variations, resulting in increased maintenance costs and disruptions for harbor users, over the period from 2012 to 2017. Prevention of safe channels for vessels was identified as a result of siltation leading to a reduction in the harbor basin's depth. This information provides a better understanding of the physical characteristics of the harbor. Furthermore, it supports decision-making processes related to infrastructure planning and maintenance and facilitates effective harbor management and navigation safety.

**Keywords:** *bathymetric data, harbor management, remote sensing, sediment variation, underwater topography*