Bathymetry Mapping of Hikkaduwa Coral Reef Area using Multispectral Satellite Imagery

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Many years ago bathymetry was determined by using conventional methods that retrieved depth at a single point at one time. Later it was developed to many modern systems which can determine water depth more accurately that are high in cost. In recent years, with remote sensing data, shallow water areas up to 25m can be easily mapped. The idea behind this method is to use the reflection intensity of various wavelengths captured by satellite sensors. While coral reefs are found in Sri Lanka, reefs around Hikkaduwa are among the most diverse and accessible which have a typical fringing coral reef with a shallow crest. The study was to estimate degradation of the coral reef by bathymetry maps of the area created with Relative Water Depth Index (RWDI) model integrated in ENVI Suite Relative Water Depth Tool which is developed by Stumpf and Holderied (2003). As they do not appear actual depths (scaled from zero to one), the depths are relative, and purpose was to deliver significant information about area's bathymetry. The yield must still be calibrated to field information to assess the real depth. According to the analysis, it was evident that the coral reef has changed around 48.5% over past 25 years (1995 to 2020) due to relative significant changes of bathymetry. By summarizing real depth values, it can be analyzed that between 2002 and 2019, the coral reef debased around 5%, depending on increasing of average depth within the study area. This has led to create a new tool for the use of multispectral satellite image data to map shallow water bathymetry, referred to as satellite derivatives bathymetry. But there was no enough data available to evaluate the performance of satellite-derived models. And with lack of high resolution and undisturbed (i.e., without cloud disturbances) multispectral satellite imageries, it limits the derivation of bathymetry data.

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