Utilizing Remote Sensing Techniques and the Allen Coral Formula for Accurate Underwater Depth Estimation Along the Sindh Coast

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Measuring underwater depth is a crucial aspect in various engineering projects such as dam and bridge construction, where accurate depth assessment is imperative for ensuring structural stability and safety. Traditional methods for depth measurement often involve time-consuming and costly field surveys, which may pose logistical challenges, especially in marine environments. However, advancements in remote sensing technology offer a promising solution to this challenge, enabling efficient and cost-effective depth estimation. In this study, we leverage remote sensing techniques to calculate underwater depth along the Sindh coast, highlighting the significance of utilizing such methodologies in engineering applications. The core of our methodology lies in the calculation of underwater depth using a mathematical model based on below surface reflectance and predefined coefficients. This model utilizes the near-infrared and green bands from the remote sensing data to derive depth values, providing a comprehensive understanding of underwater topography. Additionally, we implemented the Allen Coral formula for calculating underwater bathymetry, which is a widely recognized and validated method in marine science and hydrographic studies. The Allen Coral formula incorporates spectral data from remote sensing imagery, such as the green and near-infrared bands, to estimate water depth accurately. To validate our results, we compare the calculated underwater depths with ETOPO bathymetry data, ensuring the accuracy and reliability of our depth estimation approach.