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| **Measuring Mangrove Surface Elevation Change with your Phone** |
| **Introduction/Aim:** The resilience of coastal forest systems to climate change has been the subject of ongoing scientific study, given the importance of such systems to tidal and near-shore ecosystem health. Mangrove ecologists therefore have developed rod surface elevation tables (RSETs) to quantify coastal wetland response to rising sea levels through periodic measurement of surface elevation change (SEC). The conventional method uses 36 individual pin measurements, relative to a levelled SET arm, to gauge the ground surface at precise locations surrounding the permanent RSET installation (Lynch et al. 2015). Recently, a novel method was developed to collect elevation change measurements around SETs using a terrestrial laser scanner (Karger et al. 2021). The new method can produce a centimeter-scale digital elevation model (DEM) in a two-meter radius circle surrounding an RSET. A superior SEC measurement to the traditional pin method is achieved by subtracting a previous time-stamped DEM. The recent advent of cellular device light detection and ranging (LiDAR) sensors, combined with a wide-angle camera, is an attractive alternative to both previous measurement procedures. **Methods:** We measured a newly installed RSET network on Babeldaob, the largest island of the Republic of Palau, in the spring of 2024. Measurements were conducted using the traditional pin method, a terrestrial laser scanner, and an iPhone for comparison.**Results:** The iPhone-LiDAR approach proved superior in instrument weight, measurement duration, and root occlusion avoidance, while requiring reduced user expertise on a familiar platform. A site can be rapidly scanned to produced high-fidelity RGB-colored point-clouds with ground measurements rivalling the terrestrial laser scanning approach (~100,000 1-cm square pixels vs. 36 points for the pin method) while maintaining sub-cm scale error for relative plot elevation surrounding an RSET. A careful scanning protocol is operationally feasible and requires forestry technicians to carry lighter and less awkward equipment through complex mangrove forests.**Conclusion:** iPhone scans conducted by forestry technicians can subsequently be uploaded to the cloud for offsite-processing by point cloud data processing experts. This developing method has the potential to vastly reduce the time spent measuring ground elevation (minutes vs. hours) in mangrove forest plots, freeing up time for additional soil and forest inventory measurements at infrequently visited remote sites. |