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Mapping Topographic and Vegetation Bioshield Mass Recovery along the Shoreline Using Kite Aerial Photography

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Abstract

High-resolution aerial photographs coupled with infra-red images are useful for creating terrain models and vegetation mapping. Kite Aerial Photography (KAP) is very reliable for acquiring low altitude aerial images for low-cost and high spatial resolution. This study examined post-tsunami relief in different coastal ecosystems (i.e., mangrove, coastal shrub and sand dune vegetation) in terms of vegetation bioshield mass and sea level rise scenarios. A KAP platform was created using two light-weight automatic cameras with dual bandpass Red-NIR filters, Picavet stabilizing rig, GPS tracker and a Parafoil kite. The high resolution KAP images were processed to build mosaic images, orthorectified and geo-referenced DEMS using structure-from-motion (SfM) and remote sensing software (Agisoft PhotoScan and ENVI respectively). KAP has been utilized for coastal mapping under two scenarios: (i) Normalized Difference Vegetation Index (NDVI) for vegetation bioshield mass estimation (ii) Digital Elevation Model for sea level rise. We produced 1:1500 scale orthorectified maps of coastal habitats representing coastal shrubs, mangroves and sand dune vegetation. The image processing produced a point cloud with an average density of 35 points/m^2; a DEM with 17 cm resolution; and an orthophoto mosaic with an average resolution of 4.3 cm. The preliminary results of this case study demonstrate the application of KAP for costal habitat vulnerability assessment with an advantage of KAP as low-cost, high spatial/temporal resolution, and limited regulation. In conclusion, KAP has a great potential to bridge science with high spatial/temporal resolution *in-situ* data for environmental monitoring, where our researchers can utilize the data within a low-cost budget.In the future, comparisons of mapping data from different techniques can be improved with a KAP platform.

***Keywords*:** Kite Aerial Photography, Coastal habitat, Keyword, NDVI, Structure-from-motion