

**Title:**

A case study of alternative methods for seaweed bed monitoring: Applying camera and 3D scanner for underwater survey

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**Abstract:**

Seaweed bed is one of the most important ecosystems in shallow coastal area with their roles as ecological, physical, economic, and bio-indicator. Recently, continual loss of seaweeds caused decline of coastal environmental quality and has become an international issue to protect the seaweed habitat. As efficient monitoring on seaweed bed is required for its conservation, we applied camera and 3D scanner for alternative methods to diving. Three cameras were attached in different angle (30°, 45°, 90°) to both remotely operated vehicle (ROV) and boat to determine the proper condition to make orthophoto mosaic. Also, orthophoto mosaic were made by several patterns with or without orientation points, and different overlap rates (80%, 90%, 98%). Obtained results showed that it was best to attach the camera to the boat in 90°. Higher overlap rates enabled orthophoto mosaic covered larger area with less distortion. On the other hand, orientation points did not affect much in the limited monitoring area. 3D scanner was attached in boat to test its ability to detect soft substrate like seaweed and can be used to measure the biomass. Unlike the bottom ground of seaweed bed was determined by statistical analysis, seaweed was determined by reflection intensity of the sound wave from scanner. After removing the noise of data, the coverage and biomass of seaweed were calculated. The estimated coverage was 65.5%, which was similar with the result from optical survey by camera (67.5%), and biomass was 60.8t.

**Theme:**

Internet of Underwater Things