Development of an efficient and cost effective tool for mapping *Posidonia oceanica* in the Eastern Aegean, Greece.

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Introduction/Aim:

The declining endemic Mediterranean seagrass, *Posidonia oceanica,* is of great ecological and economic importance to coastal regions (Fourqurean *et al,* 2012, Champagne *et al.,* 2015). It's large below-ground biomass of rhizome mattes allow long term accumulation of carbon and it's estimated to store the most carbon of all seagrass species (Fourqurean *et al.,* 2012). Furthermore *P. oceanica* contributes up to €2.2 billion/yr, from ecosystem services to the European economy (Marba *et al.,* 2014, Waycott et al., 2009). *P. oceanica* meadows are declining at almost twice that of global seagrass species, due to anthropogenic disturbances (Marba *et al.,* 2014, Waycott et al., 2009). Despite the current fragility of *P. oceanica* meadows, there are still vast portions of coastline in the eastern Mediterranean which remain unmapped (Marba *et al.,* 2014, Telesca *et al.* 2015). One of the least studied countries is Greece where just a fraction (only 8% of the coastline) of the islands have been mapped (Telesca *et al.* 2015). Without information on the status of beds in the eastern Mediterranean, EU legislation to protect them is impossible to enforce efficiently. There is an urgent need for widespread mapping of *P. oceanica*, particularly in the eastern Mediterranean, so an efficient and low-cost method to map seagrass would be very beneficial.

Methods:

Seagrass extent and canopy height were estimated from DownScan sonar data, recorded from kayaks. A Lowrance Elite 7 Ti sonar is secured to the kayak in a waterproof box and controlled using an iPad. Transducer is secured to the back and lowered in and out of the water as needed. A team can cover up 15km per day at a steady pace of 5km/h. Transects are planned in Google Earth Pro and uploaded to the sonar navigation charts. Each transect is 100m apart up to a maximum distance of 300m from shore. Sonar data were analysed using Biobase-Ecosound© and assessed using ground-truthed data from drop-camera surveys. GoPros attached to a quadrat are dropped from a kayak at set locations determined by random sampling. At each point percentage cover and canopy height are estimated from the videos.

Results:

The results indicate that this method has the potential for the rapid and cost effective mapping of *P. oceanica*, particularly at depths beyond the limits of visual remote sensing (e.g. from 15m-50m). Ground truth results showed a much higher accuracy of the sonar and BioBase derived data in Samos with an overall accuracy for presence/ absence of seagrass of 77%, while in Lipsi it was 55%. One of the reasons for this, is the seagrass coverage and density in Lipsi is much lower with the meadows being much patchier in Lipsi than Samos. This method is more effective where seagrass extent is denser and continuous, however it is sufficient for providing medium resolution up to 10m, and ideal for large scale mapping.

Main Conclusions:

Despite the limitations, this method is a good low cost alternative to boat based sonar mapping. It requires minimal training to carry out well and is therefore a great opportunity to expand the mapping of the region using citizen science.

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