Changes in Seagrass Fractional Cover in Bolinao and Anda, Philippines Derived from Landsat Images

Ariel C. Blanco1, Ayin Tamondong1, Elaine Tagle1, Miguel Fortes2, Kazuo Nadaoka3

1Environmental Systems Applications of Geomatics Engineering (EnviSAGE) Research Laboratory, Department of Geodetic Engineering, University of the Philippines, Diliman, Quezon City 1101, Philippines. [acblanco.updge@gmail.com](mailto:acblanco.updge@gmail.com); Telefax: +6329208924

2Marine Science Institute, University of the Philippines, Diliman, Quezon City 1101, Philippines

3Department of Mechanical and Environmental Informatics, Tokyo Institute of Technology, O-okayama, Meguro, Tokyo, Japan

Seagrass meadows has been drastically reduced in Bolinao and Anda in the Province of Pangasinan, Philippines. It is imperative to understand the patterns of seagrass cover change in order to be able to protect seagrasses from further loss. Landsat 7 and Landsat 8 images available for years 1993 to 2014 were processed to determine the spatial and temporal distribution of changes in seagrass coverage. The images were corrected for water column effects using the Lyzenga method. Fractional seagrass coverages were estimated using the Mixture Tuned Matched Filtering (MTMF) technique on Minimum Noise Fraction (MNF) images. Pixels with high MTMF scores and low Infeasibility values were identified as seagrasses. Seagrass fractional cover was derived from the MTMF scores. The results were validated using the seagrass cover maps derived from high resolution images and seagrass field monitoring data. Zonal analysis was performed to characterize seagrass changes in eight zones. In 1993, seagrasses, in varying densities, cover approximately 71.07 km2 – 30.78 km2 in Bolinao and 40.29 km2 in Anda. These have been reduced to 14.48 km2 (Bolinao) and 8.15 km2 (Anda) in 2013/2014. In terms of Equivalent Full Coverage Seagrass Area (EFCSA), seagrass full coverage was reduced from 52.92 km2 in 1993 to around 11.25 km2 in 2013/2014. EFCSA has been reduced by 66% in Bolinao and 84% in Anda over the 20-year period. The pattern of seagrass changes indicated significant reduction in areas impacted by waters from the mariculture areas. This is evident in the northwestern part of Santiago Island, Bolinao. Seagrasses continue to thrive in areas not impacted by mariculture activities. Seagrasses in the eastern part of Anda island were almost decimated presumably because of sediments discharged from the Agno River Basin and Alaminos watershed.

Keywords: seagrass, fractional cover, MTMF

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