

Species diversity of tropical seagrasses affect fish assemblage structures, around Santiago Island, Bolinao, northwestern Philippines

*Yoshiyuki TANAKA¹, Takefumi Yorisue², Kentaro Honda^{2,9}, Yohei Nakamura³, Toshihiro Miyajima⁴, Gay A. Go^{5,7}, Tom G. Genovia⁶, Allyn D. S. Pantallano^{6,3}, Francisco Paciencia⁵, Wilfredo H. Uy⁶, Miguel D. Fortes⁵, Ayin M. Tamondong⁷, Ariel Blanco⁷, Kazuo Nadaoka⁸, Masahiro Nakaoka²

1.Mutsu Institute for Oceanography, Japan Agency for Marine-Earth Science and Technology ,
2.Akkeshi Marine Station, Hokkaido University, 3.Graduate School of Kuroshio Science, Kochi University, 4.Atmosphere and Ocean Research Institute, The University of Tokyo, 5.Marine Science Institute, University of the Philippines-Diliman, 6.Mindanao State University at Naawan, the Philippine, 7.College of Engineering, University of the Philippines, 8.School of Environment and Society, Tokyo Institute of Technology, 9.Present address: Hokkaido National Fisheries Research Institute, Fisheries Research Agency

Coastal ecosystems in southeast Asia have been deteriorating rapidly due to various types of human-induced stresses. Among them, excess nutrient and organic matter derived from fish culture has particularly affected adjacent ecosystems through the alteration of water quality and sediment conditions. Seagrass species richness are reported to decrease at sites close to aquaculture facilities. The seagrass species composition and structure are known to affect fish assemblage structures. In this study, we tried to evaluate the relationship between species diversity of tropical seagrasses and fish assemblage structures, around Santiago Island, Bolinao, northwestern Philippines, where effects of fish culture are obvious.

Around Santiago Island, 13 sites in dense seagrass beds and 13 sites from sparse seagrass beds (total 26 sites) were selected, using a satellite image. Then actual conditions of seagrasses were checked by ground truth. At the 26 sites, species compositions of seagrasses and fish assemblages were observed in Feb - Mar 2014. Shoot density of *Enhalus acoroides* was counted at 20 locations at each sites using a 0.5 x 0.5 m frame, because this species has large shoots. For other species, a 0.5 x 0.5 m frame that was divided into 25 quadrats of 0.01 m² was used, and shoot densities in 10 haphazardly selected quadrats in each of five frames were counted at each sites. The biomass of seagrasses were calculated based on the shoot density of this study and leaf dry weight in Vermaat et al. (1995). The fish visual censuses (FVCs) were conducted on 5-8 March 2014 at 26 stations. Six 1 x 20-m (20 m²) belt transects were established haphazardly using a scaled rope within a 50 m radius of each station. The transects were separated by at least 5 m. The number of individuals of the target species was counted in each transect, and their sizes (total length, TL) were recorded underwater using a ruler attached to a recording slate. All FVCs were conducted during the day between 08:00 and 16:00 h, using snorkeling at depths of 0.5-4.0 m.

The highest seagrass species richness at a site was seven species. The five sites where more than six species were observed belong to the dense seagrasses. Three sites among the dense seagrasses have only two species. Usually around two species were observed at the sparse seagrass beds. Two species *Thalassia hemprichii* and *Enhalus acoroides* were recorded, and the shoot density was relatively high at the site where the largest number of commercially important fish species were observed.

Keywords: eutrophication, fish culture, seagrass , *Enhalus acoroides*, fish assemblage, commercially important species