ABSTRACT

FATE OF EXISTING *RHIZOPHORA* PLANTATIONS AGAINST SUPER TYPHOONS: MASS MORTALITY BEYOND AGE-THRESHOLDS

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In the aftermath of super typhoon Haiyan, which devastated central Philippines on 08 November 2013, mangroves gained renewed national interest. Other than claiming thousands of lives and displacing millions of people, Haiyan wrought massive damage to infrastructure, crops, and coastal systems including mangroves. Mangroves are widely known for its various ecosystem services, e.g. habitat, nursery ground, carbon sequestration, nutrient cycling, and wind and wave barriers. Over the past decades of perceived severe decline in mangrove cover, massive mangrove planting programs had been the logical response, albeit focusing on creation of dense, monospecific *Rhizophora* stands. This practice resulted in low biodiversity, high mortality, low growth rates, and conflict with conservation of existing seagrass and mudflat habitats. Initial post-Haiyan surveys revealed higher vulnerability of *Rhizophora* spp., being unable to produce epicormic sprouts, unlike other mangrove taxa (e.g., *Sonneratia*, *Avicennia*, *Aegiceras*, etc.). This study aimed to investigate the responses of an extensive and multi-aged *Rhizophora* plantation in Bantayan Is. against super typhoon Haiyan. Damage extent, community structure, damage types, and recovery responses were assessed within and across differently-aged stands. Results show that percent mortality exhibited an S-curve relation with age; with an age-threshold of 32 years old for 95% stand mortality to occur. This implies that existing *Rhizophora* plantations in the country >32 years old are likely to suffer mass mortality in the next super typhoon such as Haiyan. Similarly, younger plantations would eventually suffer mass mortality upon reaching the age threshold. This also explains the absence of large *Rhizophora* within typhoon corridor as was observed during the broad-scale Yolanda survey. Patterns of damage within stands were also observed with trees in the core exhibiting higher mortality (98%) compared to the periphery (48%). From these results, plantation resilience appears to depend on wind velocity profile exposure and community attributes (specifically, architectural stability and recovery potential) with older trees and core trees having higher wind exposure, less stable architecture, and lower recovery. Considering the ongoing replanting activities post-Haiyan, and the monospecific planting still being implemented throughout the country, this study calls for a rethinking of current mangrove rehabilitation and enhancement practices with the aim to improve mangrove forest resiliency in the face of typhoon impacts.

Keywords: Super typhoon Haiyan, *Yolanda*, *Rhizophora* plantation, Age-threshold, Mangrove Vulnerability, Typhoon-resilient forests