Drawbacks of mangrove rehabilitation schemes: Lessons learned from the large-scale mangrove plantations

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Abstract

Mangrove rehabilitation programs received much attention in the past decades as a response to widespread global degradation. While the documented successes and failures of mangrove rehabilitation accomplishments were varied, the objective and scheme is common, mainly focused on planting and creating monospecific plantations. This study assessed the structural development and complexity of the large-scale plantations in the central part of Philippines and compared it with the adjacent natural stand as reference. Our study showed that planted forest in both sites had lower structural complexity than the reference natural forest. Between sites, secondary succession in the monospecific plantation in Banacon Island was inhibited as reflected by low regeneration potential, whereas recruitment and colonization of non-planted species was promoted in Olango Island. Even 60 years after the forest was created in Banacon Island, it still lacked the understory of young cohorts which together comprise the regeneration potential that can supposedly add to the structural complexity. Although a potential seed source from adjacent natural forest is available, recruitment and colonization of non-planted species did not progress. MDS analysis of tree density data showed clustering of planted forest from the natural stand. The average SIMPER dissimilarity was 79.9% and the species with highest contributions were R. stylosa (74.6%), S. alba (11.1%) and A. marina (10.6%). Within the natural forest, the same species had the highest dissimilarity contribution, whereas in the planted forest, only R. stylosa contributed the highest dissimilarity. The same trend was also revealed in the MDS ordination analysis of diameter at breast height (DBH). A one-way ANOSIM permutation test of the density and DBH showed a significant difference between the planted and natural forests. Thus, as part of silviculture management intervention, the current practices of mangrove reforestation need to be reviewed and evaluated to determine the trajectories of its conservation objectives to achieve the best outcome and functionality of the restored habitat.