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Stand Structure and Spatial Pattern of Mangrove Regeneration in a Degraded Peri-Urban Coastal Forest

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Abstract

Mangrove forests – notable for their global importance due to their high productivity and support for numerous ecosystem services – grow in a narrow range of the seashores and tidal parts of river estuaries in the tropical to subtropical coastlines. Their potential for carbon sequestration, nutrient cycling and coastal nutrient budgets are noteworthy; but they are threatened around the world by the conjoint impacts of human activities and natural factors. We conducted detailed field assessment of vegetation cover and the spatial distribution of trees in a degraded mangrove forest in Tudor creek, near Mombasa to describe the stand structure and spatial pattern of mangrove regeneration in degraded peri-urban mangrove forests. Modern point-pattern statistics including pair correlation and mark connections functions were used for the spatial analyses to investigate the spatial structure of mangrove regeneration in the study area. The results showed that the stand structure differed significantly across zones in the study area, with signature of some intermittent period of disturbance. Nonetheless, there was evidence of viable regeneration. Total juvenile density of all the four species found regenerating appeared to be sensitive to the influence of forest structural attributes and the degree of recurrent inundation. The juvenile density of *Ceriops tagal* showed a significant correlation with the number of harvested or damaged stumps. We found that the spatial structural pattern of *Rhizophora mucronata* population along tidal gradient showed a characteristic spatial aggregation at small scale but random distributed as the distances become larger. There was a distinct spatial segregation between recruits and adult trees, showing that juveniles tend to cluster in vegetation canopy gaps. The pattern was slightly different in the adult-adult relationship, and a rather completely opposite in the recruit-recruit associations as they showed clustering in space. Recruits were found spatially independent of the adult trees. We concluded that the effect of plant-plant conspecific interactions is more probable to inform the long-term structure and dynamics in a degraded mangrove forest. It is suggestive that successful restoration of degraded mangrove forests, especially through enrichment planting, would require consideration for the spatial structural patterns of mangrove species.

Keywords: Forest regeneration, mangrove degradation, peri-urban forest, point-pattern analysis, stand structure

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