



Greening Cities for Climate Resilience through Mangrove Diversity Conservation in Hikkaduwa and Negombo Lagoons

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Mangrove ecosystems in Sri Lanka are critical nature-based solutions for building climate-resilient, socially equitable urban futures. However, rapid urbanization, tourism development, habitat fragmentation, and unsustainable resource exploitation increasingly threaten mangrove ecosystems in rapidly developing coastal cities like Negombo and Hikkaduwa. Species including *Bruguiera cylindrica*, *Sonneratia alba*, and *Lumnitzera racemosa* are particularly vulnerable to these disturbances. This study comparatively assessed mangrove species abundance, richness, and diversity in highly fragmented mangrove ecosystems of Negombo and Hikkaduwa Lagoons, two ecologically similar yet intensively urbanized coastal landscapes in Sri Lanka. Field surveys were conducted using belt transects with 5 m × 5 m quadrats placed perpendicular to the lagoon shoreline across five sites in Negombo, and four sites in Hikkaduwa. Species diversity was evaluated using Simpson's Diversity Index (1-D), while vegetation counts were used to determine species abundance and richness. A total of 211 mangrove individuals representing seven species were recorded, including 116 individuals in the study area of Negombo Lagoon and 95 individuals in the study area of Hikkaduwa Lagoon. Negombo Lagoon exhibited comparatively a higher diversity (mean Simpson's Diversity Index = 0.274) than Hikkaduwa Lagoon (mean = 0.138). *Rhizophora mucronata* dominated Negombo Lagoon, whereas *Rhizophora apiculata* and *Bruguiera gymnorhiza* were dominant in Hikkaduwa Lagoon. Several sampling plots recorded zero diversity values, indicating monospecific stands linked to severe habitat fragmentation, and ecological degradation. Findings reveal that urban expansion, tourism pressure, and fisheries-related disturbances have significantly altered mangrove community structure in both lagoons, favoring disturbance-tolerant species while reducing overall biodiversity and ecosystem resilience. Study highlights the urgent need to integrate mangrove conservation, ecological restoration, long-term monitoring into urban climate adaptation, and coastal planning strategies. Strengthening blue carbon conservation and mangrove restoration promotes sustainable urban development, climate resilience, and social equity in Sri Lanka's coastal regions. Study highlights the importance of integrated coastal management, policies balancing ecological sustainability, community well-being, and long-term environmental resilience.

Keywords: Fragmentation, Hikkaduwa lagoon, Mangroves, Species diversity, Negombo lagoon, Simpson's Diversity Index