MSc Degree in Environmental Science

FAUNAL PIONEERS IN MANGROVE RESTORATION SITES: AN ESTIMATION OF THE DIVERSITY AND ABUNDANCE OF GASTROPODS AND BIVALVES

A dissertation submitted

by

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to

The Centre for Environmental Studies and Sustainable Development

in partial fulfilment of the requirements

for the degree of

Master of Science in Environmental Science

of

THE OPEN UNIVERSITY OF SRI LANKA

NAWALA, NUGEGODA

April, 2025

ABSTRACT

Mangrove ecosystems are among the most productive and ecologically significant habitats, providing essential services. In Sri Lanka, extensive degradation of mangroves has prompted restoration efforts across various regions. However, the success of these efforts has been largely evaluated based on vegetation recovery, with limited focus on faunal colonization—an important indicator of ecosystem functionality. This study aimed to assess the diversity, abundance and spatial-temporal patterns of gastropod and bivalve assemblages within the Pubudugama mangrove restoration site in the Puttalam District, Sri Lanka. Field sampling was conducted over a one-year period (August 2023 – July 2024) across three restoration strata (2019, 2020, and 2022 restored sites). Stratified transect-based quadrat sampling was carried out across three microhabitats: main canal, sub-canal and area of inundation. Seasonal variation was incorporated by sampling under extremely dry, dry, and wet conditions. All visible epifaunal gastropods and bivalves were collected and identified. The density was calculated and diversity was interpreted using Menhinick's richness, Shannon-Wiener diversity, Simpson's dominance, Berger-Parker dominance and Buzas and Gibson's evenness indices. A total of 15 species representing eight molluscan families were recorded. The dominant taxa belonged to the Potamididae and Ellobiidae families, with *Terebralia palustris*, *Pirenella conica*, *Pirenella cingulata* and *Geloina coaxans* being the most abundant species. Analysis revealed that older restoration sites (2019) supported significantly higher density (283.1 ± 33.1 ind./m²) compared to younger sites (2020: 114.5 ± 33.1 ind./m², 2022: 184.2 ± 33.1 ind./m²), reflecting successional trends ($P < 0.05$). Species richness peaked at the intermediate-aged (2020) site, indicating dynamic faunal turnover during early restoration phases. Also, extremely dry periods supported higher densities but reduced species richness. While quadrat location had no significant effect on overall density, canal-associated quadrats exhibited higher diversity. Biodiversity indices confirmed moderate diversity and evenness, with dominance by a few key species. These patterns suggest that while full ecological recovery has not yet occurred, the restoration site is on a positive trajectory toward functional faunal community development. The presence of bio-indicator species and habitat-structuring sessile organisms such as oysters and barnacles further support early habitat maturation. Recommendations include long-term monitoring, enhancing habitat complexity, preserving hydrological connectivity and benchmarking restored sites against natural mangroves. Future studies should expand to other faunal groups and examine the interactions between vegetation structure and faunal colonization to more comprehensively evaluate ecological recovery.