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STRUCTURAL AND FUNCTIONAL PROPERTIES OF
MANGROVE ECOSYSTEMS IN PUTTALAM LAGOON AND
DUTCH BAY, SRI LANKA

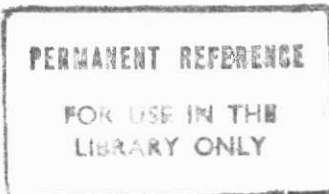
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SUMMARY

The extents of mangals and salt marshes in Puttalam lagoon and Dutch bay, Sri Lanka are approximately 3340 ha and 1506 ha respectively. Mangals at Kala Oya estuary (approximately 1837 ha in area) form the largest and the least disturbed mangrove ecosystem in Sri Lanka.

Based on the tidal and hydroperiod characteristics of the inter-tidal areas, two general types (riverine and fringe) and a special sub-type (scrub) of mangals were identified in the study area. Riverine mangals comprised 76% of the total mangals. 98% of the salt marshes are located around Puttalam lagoon.

Fourteen true mangrove, twenty two mangrove associated and five salt marsh species were encountered in these mangals. Avicennia marina and Rhizophora mucronata are the dominant and most widespread mangrove species. Generally these mangals are composed of a narrow water-front zone of R. mucronata and a back-mangrove zone of A. marina. Cerriops tagal, Aegiceras corniculatum and Lumnitzera racemosa occur in an intermediate zone.

Riverine mangals are structurally more developed/complex (complexity indices calculated were 22.16 and 8.11) than the fringe mangals (complexity indices, 1.38 - 6.78). Fringe mangals in Puttalam lagoon are the most matured (aged) mangrove stands in the study area.

Mangrove productivity studies were carried out from September 1985 to August 1987 in a riverine mangal (Kala Oya estuary) and a fringe mangal (Erumathivu island) in Dutch bay. The average annual rate of litter production in the riverine and fringe mangals are 588.14 g m^{-2}

(nearly 6.0 t ha^{-1}) and 407.33 g m^{-2} (approximately 4.0 t ha^{-1}) respectively. The average annual rates of above-ground woody growth are 614.74 g m^{-2} (nearly 6.0 t ha^{-1}) in the riverine mangals and 286.8 g m^{-2} (nearly 3.0 t ha^{-1}) in the fringe mangals. Riverine mangals record a greater annual rate of above-ground net primary production (NPP) (1207.88 g m^{-2} ; approximately 12.0 t ha^{-1}) than the fringe mangals (694.22 g m^{-2} ; nearly 7.0 t ha^{-1}). The annual rate of NPP in the water-front zones (1300.47 g m^{-2} in Kala Oya and 874.56 g m^{-2} in Erumathivu) are higher than those in the back-mangrove zones (1115.28 g m^{-2} in Kala Oya and 513.88 g m^{-2} in Erumathivu).

Accumulation of leaf litter in Kala Oya mangal (an average of about 41.0 (dry weight) g m^{-2} in R. mucronata zone and about 38.0 g m^{-2} in back-mangrove zone) are higher than that in Erumathivu mangals (about 4.0 g m^{-2} and 33.0 g m^{-2} in the water-front and back-mangrove zones respectively).

A. marina leaf litter lost half ^{of} its original weight within 30 days and R. mucronata within 2-90 days. Average daily rates of litter decomposition in the fringe mangals ($0.0201 \text{ g day}^{-1}$ - $0.1095 \text{ g day}^{-1}$) for A. marina and $0.0111 \text{ g day}^{-1}$ - $1.2111 \text{ g day}^{-1}$ for R. mucronata are higher than those in the riverine mangals ($0.0293 \text{ g day}^{-1}$ - $0.0778 \text{ g day}^{-1}$ for A. marina and $0.0075 \text{ g day}^{-1}$ - $0.0216 \text{ g day}^{-1}$ for R. mucronata). The average daily litter decomposition rates in the water-front zones (average rate of $0.0343 \text{ g day}^{-1}$ at Kala Oya and $0.4883 \text{ g day}^{-1}$ at Erumathivu) are greater than those in the back-mangrove zones (average rate $0.0499 \text{ g day}^{-1}$ at Kala Oya and $0.2783 \text{ g day}^{-1}$ at Erumathivu). The gastropod, Terebralia palustris appears to play an important role in leaf litter breakdown in these mangals.

Significance of mangrove leaf litter production and decomposition to coastal fisheries and management implications of the findings are discussed.