

MANGROVE PRIMARY PRODUCTION AND ABOVE-AND BELOW-GROUND BIOMASS IN SAWI BAY, SOUTHERN THAILAND

Daniel M. Alongi and Paul Dixon

Australian Institute of Marine Science, PMB No. 3, Townsville MC, Queensland 4810, Australia

ABSTRACT

Above- and below-ground biomass and primary productivity of mangroves was estimated at two 3-yr old, one 5-yr old and one 25-yr old forest in southern and northern Sawi Bay. Mean stand density (5402 stems ha⁻¹, diameter at breast height (11 cm) and above-ground biomass (344 t DW ha⁻¹) were significantly greater at the oldest forest. Among the three younger stands, tree densities ranged from 9623 to 15,067 stems ha⁻¹, diameter at breast height ranged from 3 to 4 cm, and above-ground biomass ranged from 42 to 65 t DW ha⁻¹. The bulk of above-ground biomass in all four forests was vested in stems (63-78% of total biomass). Vertical distribution of fine roots indicated live roots constituted only 3 to 16% of total below-ground biomass. Below-ground biomass was significantly greater at the oldest forest (35.6 t DW ha⁻¹) than at the other three stands (range: 8.1-23.1 t DW ha⁻¹). Total living below-ground biomass accounted for 9 to 35% of total living biomass among the four forests. Estimates of leaf area index (LAI) varied from 1.6 to a maximum of 5.1 at the oldest forest. Net canopy primary production ranged from a minimum of 24.5 tC ha⁻¹ yr⁻¹ at the 5 yr-old forest to a maximum of 76.6 tC ha⁻¹ yr⁻¹ at the 25 yr-old forest. Of the two 3 yr-old forests, the *Rhizophora* forest was more productive (53.7 tC ha⁻¹ yr⁻¹) than the adjacent *Ceriops* stand (33.3 tC ha⁻¹ yr⁻¹). Extrapolating to the entire area of mangroves in Sawi Bay (3225 ha) based on similar forest types and subtracting canopy respiration, total canopy net carbon fixation averages 34 tC ha⁻¹ yr⁻¹ for a grand mean of 109,650 tC yr⁻¹. Compared with other Southeast Asian mangroves, the forests of Sawi Bay are highly productive.