

**PELAGIC CARBON FIXATION AND HETEROTROPHY
IN SHALLOW COASTAL WATERS OF SAWI BAY, SOUTHERN THAILAND**

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ABSTRACT

Sawi Bay is a shallow, moderately impacted embayment that quickly becomes turbid during strong wind events. Measurements of nutrients, light, and plankton production indicate that while primary production in some bay locations is light-limited, nutrient availability may have some impact on variability of phytoplankton production. Mean depth-integrated phytoplankton production in the bay ranged from 342 to 862 mgC m⁻²d⁻¹ on a typical sunny day and from 223 to 531 mgC m⁻²d⁻¹ on a typical cloudy day. Depth-integrated phytoplankton production (mean: 330 mgC m⁻²d⁻¹ in one of the mangrove creeks was not much different than in Sawi Bay. Extrapolated to the entire bay, daily and annual totals of phytoplankton production were 68 tC and 25,000 tC, respectively. In the wet season, bacterioplankton production was high (mean: 119 mg C m⁻³ d⁻¹; range: 34-397 mg C m⁻³ d⁻¹), with rapid growth rates and turnover (mean: 7 days). Rapid bacterial activity was reflected in rapid water-column respiration in I Laet Creek (mean: 487 mg C m⁻³d⁻¹) and in the bay proper (mean: 642 mg C m⁻³d⁻¹). Integrated by depth, mean pelagic respiration rates (682 mg C m⁻²d⁻¹ in I Laet Creek; 1490 mg C m⁻²d⁻¹ in the bay) exceeded phytoplankton production by two fold, indicating that Sawi Bay waters were net heterotrophic. The ratio of bacterioplankton to phytoplankton production ranged from 35-87% compared with ratios ranging from 17-30% in other aquatic ecosystems, indicating that bacterial activity was high relative to phytoplankton production in the bay. Both the rapid respiration rates and the bacterioplankton/phytoplankton production ratios imply that other sources of organic matter (sewage, aquaculture effluent, mangrove debris, river runoff) sustain the high levels of heterotrophic activity in Sawi Bay, at least in the wet season.