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MANGROVE LITTER-FALL STUDIES AT THE AJKWA ESTUARY, IRIAN JAYA

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ABSTRACT

Litter traps were used to estimate litter-fall production in two mangrove communities in the Ajkwa estuary, part of the PT Freeport Indonesia project area. The two communities studied included *Bruguiera gymnorrhiza - Camptostemon schultzii – Rhizophora apiculata* (Site 1) and *B. cylindrica - R. apiculata* (Site 2). The period of study was from February 16, 1998 to October 27, 1998 for Site 1 and February 25, 1998 to December 12, 1998 for Site 2. Total annual litter-fall for Site 1 and Site 2 was estimated at 800.78 g/m^2/yr and 744.35 g/m^2/yr, respectively. For both communities, litter-fall consisted of leaves (61.5% of total litter production at Site 1 and 51.8% at Site 2), reproductive parts (20.5% at Site 1 and 11.1% at Site 2) and twigs (18.0% at Site 1 and 37.1% at Site 2). The monthly rate of total litter production at Site 1 displayed two peaks during the study period (a major peak in March and a minor one in October) while Site 2 showed only a single peak in February. Monthly rates of production for both leaf and twig litters at both sites peaked only once during the study period while rates of litter production from plant reproductive parts peaked twice. In both communities, the rate of twig litter production coincided with litter production from reproductive parts. During the sampling period, litter-fall rates varied substantially but were not significantly correlated with rainfall. However, the rate of twig litter production in both communities was significantly correlated with wind velocity.

Keywords : Ajkwa estuary, community, litter-fall, litter trap, mangrove, rate of litter-fall, reproductive parts, twig

Organic material covering forest floors, commonly referred to as litter, is primarily composed of dead plant parts (including leaves, twigs and reproductive parts). Litter production is defined as the weight of all dead material (of both plant and animal origin) deposited on a given unit area of soil surface within a specified time period (Chapman, 1986). Estimations of abundance and composition of litter-fall are important to the study of nutrient cycling (Proctor, 1984), primary production (Ovington, 1962) and the structure and function of the ecosystem (Kusmana *et al.*, 1998). Therefore, the study of quantitative aspects of litter-fall continues to be an important part of forest ecology (Proctor *et al.*, 1983). However, rates of forest litter production around the world vary widely due to differences in community structure, stand age, geographical situation (altitude), and seasonal climatic changes (Tanner, 1980).

Mangrove swamps are thought to be highly productive communities (Lugo & Snedaker, 1974) and are recognized as an important source of detritus to marine and estuarine ecosystems (Snedaker, 1978) supporting a variety of aquatic organism (Odum & Heald, 1972). Snedaker (1978) also reported that litter-fall produced in mangroves enters the estuarine system, where it forms the basis for a complex food web. Despite the likely importance of mangrove litter-fall to the aquatic ecosystem, little information exists regarding productivity in Indonesia.

The island of Papua contains one of the largest expanses of unmodified mangrove forests in the world. However, no recent data on the productivity of mangroves in this region have been published. The intention of this study was to provide baseline data on the input of organic matter from the mangrove communities into the surrounding coastal ecosystem; specifically to estimate monthly productivity and composition of litter-fall from mangroves in the Ajkwa river estuary within the PT Freeport Indonesia (PTFI) project area.

DESCRIPTION OF STUDY AREA

PT Freeport Indonesia (PTFI) Project Area

The Contract of Work (COW) signed between the Government of Indonesia (GOI) and PTFI in 1991, granted PTFI two working areas defined as:

(a). **Contract of Work Mining Area (COW A).** This area is approximately 100 km^2 and is the location of most mining activities. Activities include exploration, open-pit, and underground mining, ore processing (at the mill site) and mine overburden disposal.

(b). **Contract of Work Project Area (COW B).** This area of approximately 2,890 km^2 connects the mining area in the north of the Arafura Sea in the south. Supporting facilities and infrastructure including Tembagapura, Ridge Camp, Kuala Kencana, Amamapare Port, Timika Airport and other areas situated in the COW Project Area.

PTFI COW Area (Mining Area and Project Area) are in the Mimika Baru District of the Mimika Administrative Regency.

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