

Developing canopy biology in Lambir Hills National Park

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The forest canopy biological studies in Lambir Hills National Park were initiated in 1992 when Sarawakian and Japanese scientists established the canopy walkway system. It aims to study ecological processes in the tropical forest with particular emphasis on ecological processes taking place at forest canopy. The canopy walkway of about 300 m long and two tree towers has been utilized for the researches on phenology and eco-physiology of trees, pollination biology, canopy entomology, and forest meteorology. In March 2000, another canopy facility, canopy crane, was established to increase further ability to access the forest canopy. The canopy crane with 80 m in height and 75 m-long arm brought us into a new phase of the studies on forest canopy processes.

The research has been much concentrated on the elucidation of the mechanisms of general flowering and canopy-atmosphere interaction in the tropical rain forest. It includes baseline researches on tree phenology, seed/litter fall, insects' interactions with trees, dynamics of stored substances in the trees, and meteorological conditions. Using these data, both proximate and ultimate factors of the general flowering have been tested. The meteorological triggers and eco-physiological condition of trees, which cause the general flowering, have been observed, and drought seemed to be most probable climatic cue for flowering induction. The storage of starch in roots was used for fruiting, though that in branches was for leaf flushing and probably for flowering. The pollination efficiency (promotion) and predator satiation hypotheses has been tested as the ultimate factors of general flowering, though clear results have not been obtained yet.

The site is also used for eco-physiological studies of trees. Photosynthetic activities in various position of trees can be measured by canopy access devices, and contribute to the construction of the whole forest models of carbon and water budget. Eco-physiological activities of many tropical species have been made clear by the series of studies. These data can also be used for the cross check of carbon flux measurement, and the validation of remote sensing data. Carbon and water budget of the tropical rain forest is to be estimated in three ways, by flux measurement, tree enumeration, and integration of eco-physiological processes. Three dimensional canopy structure and reflection factor of the canopy have been investigated both from satellite and canopy crane.