

Light Diffusion in the Tropical Dry Forest of Costa Rica

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LAI, the total leaf area in relation to the ground, determines the extent of light interception by the canopy, and is therefore directly related to carbon and water exchange with the atmosphere. LAI also has an impact on tree growth and recruitment through the interception of light, which in turn affects primary productivity. Even though many instruments exist for estimating LAI from the ground, they are often laborious and costly to run continuously. Measurements of LAI from the field using traditional sensors (e.g., LAI-2000) require multiple visits to the field under very specific sky conditions, making them unsuitable to operate in inaccessible areas and forests with dense vegetation, as well as areas where persistent sunny conditions are the norm like the tropical dry forests. With this context, we proposed a factor to characterize light use efficiency based on NDVI and LAI measurements taken from the field in the tropical dry forest of Santa Rosa National Park in Costa Rica. This factor, defined as “K”, was calculated using daily NDVI data based on PAR (Photosynthetic Active Radiation) measured by flux towers and with monthly measurements of LAI using the LICOR (LAI-2000). After obtaining the “K” coefficients for each phenological stage of the forest, a regression analysis was performed in order to assess the degree of correlation between the LAI and NDVI. This “K” coefficient makes possible to obtain accurate LAI values of tropical dry forests in intermediate stage of succession, using only NDVI data derived from satellite (e.g., MODIS) without any intervention in the field.