

## Forest Edge Microclimate at Ulu Sat Forest Reserve

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### Abstract

In fragmented forests, certain area experiences changes in microclimatic conditions especially on the edges. This microclimatic changes can influence the ecological processes and reflects subtle changes in ecosystem function such as soil respiration, nutrient cycling and plant regeneration. A study was carried out at three forest edges located in Ulu Sat Forest Reserve (FR), Kelantan, which are Bukit Batu Tapong, Jeram Linang and Bukit Bakar. The aim was to describe the microclimate condition and assess whether these microclimatic variables influence the distribution and vegetation structure from the forest edge to the exterior (100 m distance). As the air temperature gradually declining from the forest edge to the forest interior, the relative humidity and soil moisture increase steadily for all study site. The highest amount of tree species belongs to Euphorbiaceae family with the most common species, *Baccaurea sumatrana*, accounting for 11.6% of total individual encountered in the study site. Most trees are below 30 cm DBH, with Bukit Bakar having the largest proportion (50.6%) followed by Jeram Linang (31.8%) and Bukit Batu Tapong (17.6%) respectively. This shows that stands are developing and forest regeneration is present. The occurrence of distortion at the forest borders resulted in different patterns of microclimate and vegetation edge effects.

Keywords: forest edge, microclimate, Ulu Sat Forest Reserve

### 1. Introduction

Forest fragmentation is an activity associated with deforestation, resulting in smaller and isolated forest patches (Fahrig, 2003) and also a creation of degraded forest edge areas (Villard and Metzger, 2014). It influences ecological processes and reflects subtle changes in ecosystem function such as soil respiration, nutrient cycling, plant regeneration (Smith and Johnson, 2004; Laurence et al., 2002). In addition, it created areas subject to "edge effect" where ecological condition are different from interior forest as regards vegetation structure and productivity, understorey species and microclimate (Forman, 1995; Murcia, 1995; Matlack and Litvaitis, 1999).

Microclimate can be defined as the climate at small scale ranging from 0.01 to 100 meter (Oke, 1978). The factors of microclimates generally include temperature (air and soil), light intensity, precipitation and humidity (air and soil). The understorey microclimate near a forest edge has been shown to be hotter and drier than that of continuous forest but the extent of the edge's influence is unclear. Study found that microclimatic changes up to 60 m from the edge in a forest reserve (Bernaschini, 2019). In contrast, Harper et al., (2017) found no apparent microclimatic alteration beyond 20 m from the edge in a tropical forest. One possible explanation for the contrast between these two studies is that the edges involved were of different ages. The change in edge effects over time is as yet poorly understood. Shafaghat et al., (2016) reported that changes in microclimate conditions can dramatically alter the ecosystem's structure and function, particularly