Logging Impact to Diversity of Epiphytes at Malinau Research Forest (MRF)-CIFOR Malinau Regency

by Ismail Akas

Logging Impact to Diversity of Epiphytes at Malinau Research Forest (MRF)-CIFOR Malinau Regency

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Abstract

The aim from this research is to find out impact of the 6 years after logging to the various kinds of epiphytes and its porophyte in the climax forest to the broadness of 6 hectares and the log over area to the broadness of 12 hectares at Malinau Research Forest (MRF-CIFOR) the village of Seturan – district of Long Loreh, the regency of Malinau. In the climax forest it could be found 8009 or 11.5 individual epiphytes of each porophytes, in log over area being found 4671 or 6,7 individual epiphytes of each porophytes. Bring about of degradation sum of individual 71.1% and species 18.1%. The porophyte in the climax forest to the amount of 696 trees are consisting of 179 species in 85 genera of 39 families, with 417 trees (59.9%) each of them has a diameter runs 36-67 cm, whereas in the log over area being found 610 trees consisting of 162 species in 101 genera of 42 families with 484 trees (79.9%) each of them has got a diameter runs from 20-51 cm.

Keywords*: climax forest, log over area, microclimate, epiphyte.*

1. Introduction

Influence of plants in a community became very important with the increasingly large size of plants and increasing numbers of plants. In the early growth phase, plants, micro-climate is only influenced by it, but then gradually affected by meso-and macro-climate. Plants, either individual or in a group, are seen as something complex and sensitive to changes in climate elements [1].

Conditions and the availability of the elements of a favorable climate are very important for the regeneration and establishment of forest formations. Conversely canopy closure condition of an expanse of forest stands will affect the fluctuation of the elements of microclimate, so that every form of life in the forest ecosystem components including plants have different abilities in terms of meeting needs for environmental conditions including light, humidity, air temperature and climate elements other. Therefore, differences in the fulfillment of the necessities of life can form a community of plants that have certain characteristics [2].

Forests and climate are two components that is related both macro and especially micro. Changes in any one of these components are directly or indirectly affect the other component [2]. Vegetation that grows in rain forests to produce micro-climate which is three dimensional and very complex, in this collection significantly umbrella canopy formed naturally produces micro-climatic conditions under the canopy were significantly different compared with the micro-climate outside the forest and especially in open land. Most micro-climatic conditions are very different types of rain forests and varied vertically from the top of the canopy to the forest floor, and horizontally from one location to another in an "umbrella" of forest canopies [3].

2. Experimental Detail

Research Areas

The details are described by Machfudh and Kartawinata [4], as follows:

1. Location

The experiment was conducted at the climax forest and logged-over forest at the Forest Research Station Bulungan Research Forest (BRF) - Center for International Forestry Research (CIFOR), village-subdistrict Seturan Long Loreh in Malinau (180 km from the town of Malinau). Size total acreage of Forest Research Bulungan (BRF-CIFOR) is approximately 321 000 hectares. The observation in 1997 to use the Landsat TM-5 showed a wet tropical forest in the area of Research Station Forest-CIFOR BRF Seturan consists of climax forest (97.84%), secondary forest (2:12%) and the open land (0.04%).

2. Topography

Topographic conditions of the area of Forest Research Station BRF - CIFOR Malinau Seturan-hilly, located at an altitude between 100-300 m above sea level, with slopes varying between 10% - 70%. While 40% of the total BRF area has slopes between 25-40% (including in Seturan), while areas with greater slope (steep to very steep) lots located on the west and southwest. Based on data obtained by using the Digital Elevation Model (DEM) from satellite Radarsat can be obtained information that the 84.24% area of BRF is hilly area with altitude of more than 300 m above sea level. An 11.43% is an area with undulating topography, with little there is a flat area.

3. Climate

Climate data have been obtained from PT Inhutani II Unit Malinau show that the forest areas managed by the BRF-CIFOR and its surroundings are included in the precipitation type A on the basis of Schmidt and Fergusson [5] with dry periods of less than two months and wet months over nine months, the average rainfall was recorded around 3790 annual mm/year.

Permanent sample plots at the Forest Research Area BRF Seturan CIFOR Malinau [4]

Dipterocarpaceae forest Lowland is a major extensive forest type contained in the BRF, very rich with trees that have a 35-40 m tall, dominated by trees with $\geq$ 10 cm a diameter tribes, particularly Meranti (*Shorea* sp.), Keruing (*Dipterocarpus* sp.) and Merawan (*Hopea* sp.). *Agathis borneensis*, are commonly found growing in forests with sandy soils in the BRF area, apart from that are commonly found in species of Fabaceae, especially *Koompassia excelsa*, or called "Bengeris" or “honey tree” by local residents.

Number of permanent sample plots in the plot (PSP) in the BRF-CIFOR totaling 24 plots, each measuring 100m x 100m (1 hectare), and the whole is a mixed forest Dipterocarpeceae. PSP location is located approximately 30 km east of Forest Research station BRF-CIFOR.

3. Result and Discussion

Microclimate Forest

Observations of climate elements using Data Logger that records every 5 minutes automatic, to know his condition at the climax forests and logged-over forests, in locations that are still often found epiphytic. The observation is presented in Figure 1 and 2 (Appendixes).

Condition of the elements vertically on the microclimate of forest stands or tree has been described by Sujalu (1999) who quoted from Walsh (1952) and Geiger (1959) [3,6] that the micro-climate conditions most of the rain forest type is very different and very varied vertically from the top canopy to the forest floor, and horizontally from one location to another within a forest canopy umbrella. While in the woods differs between the various sizes hiatus, between the forest growing and forest climax. In the rain forest, the intensity of light reaching the forest floor is very low compared to the peak (above) canopies. The maximum air temperature and the average is also lower in the forest floor with air humidity (RH) is always higher than in the forest canopies.

According to Daniel [7], quoting from Larcher (1975), the reduction of the number of transmissions (interception) of light through the forest canopy depends on canopy types, shapes and canopy strata, and the homogeneity of canopies. Because of the high intensity of light available at different strata within a forest stand is very influential on the size of species dominance, diversity of vegetation, canopy class differentiation, the ratio of live crown and crown overall dimensions. So, if the requirements of the lighting needs of plants will be known, then it can be controlled stand structure and productivity, regeneration type, etc.

Conditions elements in a vertical micro-climate are very determine the diversity of other life forms found on a tree. In a forest stand type formation, composition and diversity of epiphytes is different for each different height in a host tree. Composition and vertical distribution of epiphytic vegetation is primarily determined by the variability microhabitat while its characteristics are determined by the humidity and lighting under the canopy [8].

Table 2 shows the diversity of epiphytes in the forest climax and the LOA. Mean while, Table 1 shows the number of individuals and the number of epiphytic species that does not always follow the changes in the levels of micro-climatic conditions of the same. Changes in air temperature and light intensity on a daily average at each show the lower strata of the canopy to the base of the tree turned out to produce the conditions change in the number of epiphytic species from the canopy to the base of trees but is not accompanied by changes in the number of epiphyte individuals / ha. These conditions are not the same as that found in the LOA to those in Table 2. That situation has been explained that the diversity of vegetation on the vertical structure of forest stands or on a tree is formed as regulated by the availability of lighting vertically as well. That situation has been explained that the diversity of vegetation on the vertical structure of forest stands or on a tree is formed as regulated by the availability of lighting vertically as well.

Species composition and community structure of epiphytes is strongly influenced by fluctuations in environmental factors, so that environmental factors are the most important component because it affects the stability of the forest interior environment, especially the components that maintain stable levels of bark wetness and this means a relatively fixed rate sunlight penetration so that the percentage of sunlight blocked by every strata of the forest canopy is also relatively not change [9].

Logging activity can affect the presence of epiphytic through changes in canopy closure and depreciation, which would lead to the condition of the elements of interior forest microclimate changed suddenly and lasts a long time especially penetration of sunlight, temperature and humidity, which will potentially affect abundance and distribution of species [9-11].

4. Conclusion

Air temperature and average daily radiation on canopy is always higher than the other trees; on the contrary there is always the highest air humidity at the base of the tree. Air temperature and radiation conditions of daily average in the LOA is higher than in the climactic forests, instead of air humidity on the daily average is higher than the climactic forest LOA.

Logging activities have caused degradation number of individuals and number of epiphytic species.

5. Acknowledgements

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Appendixes

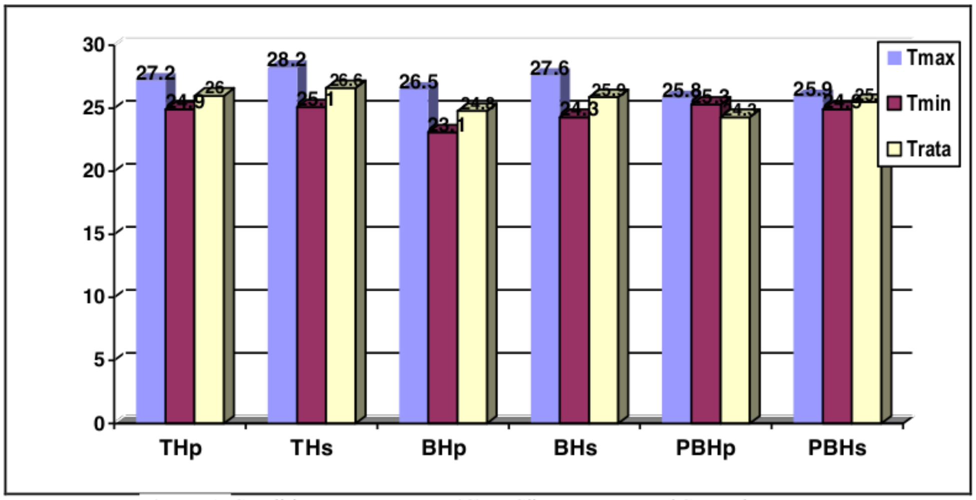

Figure 1. Conditions Temperature (C) at Climax Forest and Secondary Forest

Description: THP: Crown Climax forest; THS; Heading Secondary Forest; BHP: Trunk Climax forest, BHS: Trunk Secondary Forest; PBHs: Jetty Climax forest Trunk; PBHs: Base of Secondary Forest Trunk.

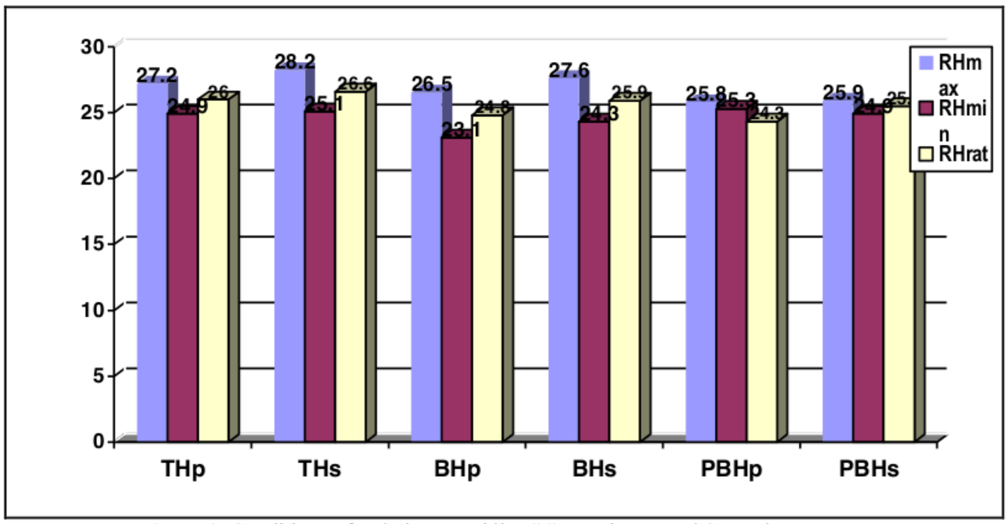

Figure 2. Conditions of Relative Humidity (%) at Primary and Secondary Forest

Description: THP: Crown Climax forest; THS; Heading Secondary Forest; BHP: Trunk Climax forest, BHS: Trunk Secondary Forest; PBHs: Jetty Climax forest Trunk; PBHs: Base of Secondary Forest Trunk

Table 1. Epiphyte Diversity in Forest Forest Climax and logged over areas

No	Vertical Stratum	Climax forest		Log over area	
		Sum of individu	Sum of species	Sum of species	Sum of species
1	Trunk	1042	101	318	93
2	Stem	118	43	17	22
3	Bole of tree	176	27	54	25

Table 2. Fifteen Epiphyte Best Many Types Found in the Subject Tree in Climax forest (CF) and Log over area (LOA)

No	Species	Genera	Family	Sum Of Individual	
				CF	LOA
1.	*Lycopodium* sp.	*Lycopodium*	Lycopodiaceae	204	169
2.	*Bulbophyllum binnendijkii* J.J.S.	*Bulbophyllum*	Orchidaceae	197	-
3.	*Selliguea lima (*v.A.v.R.) Holtt.	*Selliguea*	Polypodiaceae	178	161
4.	*Drynaria quercifolia* (L.) J.Sim.	*Drynaria*	Polypodiaceae	176	-
5.	*Bulbophyllum beccariu* Rchb.f.	*Bulbophyllum*	Orchidaceae	165	102
6.	*Bulbophyllum gracillum* Rolfe.	*Bulbophyllum*	Orchidaceae	143	-
7	*Pyrrosia angustata* (Sw.) Ching	*Pyrrosia*	Polypodiaceae	141	99
8.	*Bulbophyllum lepidum* (Bl.) J.J.S.	*Bulbophyllum*	Orchidaceae	132	-
9.	*Bromheadia finlaysiniana* (Lindl.) Miq.	*Bromheadia*	Orchidaceae	117	-
10.	*Bulbophyllum vaginatum* (Lindl.) Rchb.	*Bulbophyllum*	Orchidaceae	144	-
11.	*Cimbidium finlaysonium* Lindl.	*Cymbidium*	Orchidaceae	110	-
12.	*Acriopsis javanica* Reinw.	*Acriopsis*	Orchidaceae	108	102
13.	*Sarcanthus subulatus* Rchb.f.	*Sarcanthus*	Orchidaceae	107	-
14.	*Humata repens* (L..fill.) Diels.	*Humata*	Davaliaceae	106	-
15.	*Crypsinopsis wrayi (*Baker) Copel	*Crypsinopsis*	Polypodiaceae	104	88
16.	*Nephrolepis acutifolia* (Desv.) Chrst.	*Nephrolepis*	Nephrolepidaceae	-	176
17.	*Nephrolepis davaloides*	*Nephrolepis*	Nephrolepidaceae	-	169
18.	*Bulbophyllummacranthum* Lindl.	*Bulbophyllum*	Orchidaceae	-	98
19.	*Bulbophyllumpurpurescens* Ted. & B.	*Bulbophyllum*	Orchidaceae	-	89
20.	*Goniophlebium subauriculatum* (Bl.) Presl.	*Goniophlebium*	Polypodiaceae	-	89

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