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Diversity Orchid After 6 Years of Forest Logging at Malinau Research Forest (MRF)-CIFOR Seturan- 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 orchids at Malinau Research Forest (MRF-CIFOR) the village of Seturan – district of Long Loreh, the regency of Malinau.

Input data species of orchids using census method in the climax forest to the broadness of 6 hectares and the log over area to the broadness of 12 hectares. In the primary forest it could be found Orchids is consist 3324 individu from 43 species. In log over area being found 1649 individual from 38 species. Thus 6 years after logging bring about of degradation sum of individual 71.1% and species 18.1%.

The host tree 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, diversity

INTRODUCTION

Orchidaceae only a small group of plants, but it is a significant part of all plant species are found in tropical forests. Because it has a very importance role in characterizing the types of tropical forest, including nutrient recycling systems in various types of forest ecosystems (Mitchell, 1989).

The results Gandawidjaja (1997) showed in kalimantan known as Orchids land has recorded 2500-3000 orchid species (75% orchid Indonesia-Malaysia or or Malesia), or about 10% of all species of orchids in the world. The diversity of orchids in various types of trees, growth rates, and parts of trees that became the host for its dependence on microclimatic conditions of forest stands. That led to the existence of a number of colonies of orchidscan only be found in certain tree species or in certain parts of the tree, otherwise other colonies can be found in each type of tree and on every part of the tree. For that conducted the study with the objective to identify orchids and its host tree, in climax forest and in logged forest that is harvested with a conventional system (TPTI).

MATERIALS AND METHODS

A. Overview: Research Areas (Machfudh and Kartawinata. 2001)

1. Location

The experiment was conducted at the climax forest and logged-over forest at the Forest Research Station Malinau Research Forest (MRF) - Center for International Forestry Research (CIFOR), Seturan village-subdistrict Long Loreh in Malinau (180 km from the town of Malinau). Size total acreage of Forest Research Malinau (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., 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 (1951), with dry periods of less than 2 (two) months and wet months over 9 (nine) months, the average rainfall was recorded around 3790 annual mmyear^{-1}.

4. Hydrology

Topographic conditions are largely a local cause BRF-CIFOR area is passed by 3 (three) major rivers namely the Malinau River, which flows from east to west and then turned north; Tubu river, which crossed the mid-BRF area and flows northward and then then turned east to join the river Mentarang Mentarang river will join the Malinau River in the village of Cow Island and is the limit of BRF in the north, two rivers, will join with the river Sesayap. Also along the western boundary BRF Bahau river also flows from north to south direction, which would then meet with greater Kayan river. Based on the existence of these large rivers and the water flow pattern, the BRF area can be grouped into 3 (three) main water catchment area or water basin (DAS), the Malinau watershed (44.09%), DAS Tubu / Mentarang (36.04 %), and DAS Bahau (19.86%).

B. Permanent sample plots at the Forest Research Area BRF Seturan CIFOR Malinau (Machfudh, et al. 2001)

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), the whole is a mixed forest Dipterocarpeceae. PSP location is located approximately 30 km east of Forest Research station BRF-CIFOR.

The data have been obtained from 24 PSP, each with size 1 (one) hectare, prior to logging shows that the tree diameter (dbh) had an ≥ 20 cm average basal area 4.30 m^2/ha and density of 253 trees / ha. The trees from the Dipterocarpaceae family dominated the entire plot of the study, reaching 27% of tree density and 40% basal area, as well as the main component of the forest canopy. Other types that have a high density and basal area is *Shorea elliptica S. maxwelliana* and *S. parvifolia*, while Shorea is the largest tree with a diameter 199.6 cm

C. Diversity of orchids

Most orchids are epiphytes living at the canopy grows in colonies with *Licopodium Selliguea* sp. of the genera of ferns which are found-shaped pile substrate (moss). Overall the number of orchids are found in logged over area (LOA) of 12 hectares as 1492 individuals or as much as 124.3 individuals per hectare, which is included in 37 species from 18 genera.

Orchids which live singly or in the form of colonies generally found to grow and thrive in the tree canopy (97.6%) mainly on the branches that are large. Some other small (only three types, or 2.4%) were found living on the trunk free from branches and none of the orchid species are found living on the bole of the tree (ground level).

Table 1. 10 (ten) Orchids often found in the Canopy In Climax Forest (CF) and Log Over Area (LOA)

Species	Genera	Sum Of individu	
		CF	LOA
Bulbophyllum binnendijkii J.J.S.	*Bulbophyllum*	197	-
Bulbophyllum beccariu Rchb.f.	*Bulbophyllum*	165	102
Bulbophyllum gracillum Rolfe.	*Bulbophyllum*	143	-
Bulbophyllum lepidum (Bl.) J.J.S.	*Bulbophyllum*	132	-
Bromheadia finlaysiniana (Lindl.) Miq.	*Bromheadia*	117	-
Bulbophyllum vaginatum (Lindl.) Rchb.	*Bulbophyllum*	144	-
Cimbidium finlaysonium Lindl.	*Cymbidium*	110	-
Acriopsis javanica Reinw.	*Acriopsis*	108	102
Sarcanthus subulatus Rchb.f.	*Sarcanthus*	107	-
Bulbophyllum macranthum Lindl.	*Bulbophyllum*	-	98
Bulbophyllum purpurescens Ted. & B.	*Bulbophyllum*	-	89

These conditions correspond to the results of research from Partomihardja (1991) on the plot area of 6 ha in secondary forest Wanariset Sambodja-Kutai Kartanegara indicating that Orchidaceae is the type easy to find, rich in species, spread, and the most abundant. Something similar is also conveyed by Walter (1971), OOsting and Migenis (1993) that the presence and distribution of orchid generally abundant in the canopy, especially those that grow relatively flat at various canopy heights. In Table 1 are given 10 species of orchids orchids are often found in the canopy of trees and only three species that grow on the trunk free from branches.

In CF and LOA orchids found mostly in the form of colonies on the former branch or limb fractures were deep enough or the sidelines of the branches are large and filled with litter or organic ingredients as well mildew cracks in tree trunks. Dominant orchids found alive on a tree trunk with a large diameter and are not found living in other parts of the tree, because it did not like the shade in all parts of his life. Though often found to accumulate on one side of the rod opposite the sun. Where the stick on cracks or fissures are narrow tree trunks perakaraan system is much longer and extends over parts of the body, whereas if his life in the cracks or holes large enough fault branch and the (full litter) then the roots is almost invisible. It shows orchids although tolerant of direct sunlight but not resistant to

drought. The existence of orchid can be used as an indicator that shows the area is very humid environmental conditions and often foggy.

Table 2. The most Orchidaceae being found at the bark tress in the Climax Forest (CF) and Log Over Area (LOA)

Species	Genera	Sum Of individu	
		CF	LOA
Agrostophyllum Bl.	*Agrostophyllum*	67	-
Bulbophyllum gracillum Rolfe	*Bulbophyllum*	57	14
Bulbophyllum lepidum (Bl.) J.J.S.	*Bulbophyllum*	57	-
Bulbophyllum beccariu Rchb.f.	*Bulbophyllum*	33	-
Bulbophyllum vaginatum (Lindl.) Rchb.	*Bulbophyllum*	32	-
Bulbophyllum macranthum Lindl.	*Bulbophyllum*	23	-
Bulbophyllum purpurescens Ted.&B.	*Bulbophyllum*	17	-
Sarchantus subulatus Rchb.f.	*Sarcanthus*	-	14
Pholidota imbricata (Rchb.f.) Lindl.	*Phollidota*	-	9

Orchid on the bole of tree, in addition to type *Eria Javanica* (Bl.) Lindl. which is the tribe of Orchidaceae in the primary forest. This situation suggests that different types of orchids tolerant of sunlight, the humidity is not too high, this condition is ideally located on the canopy (Wolf, 1994).

Felling trees and looming large in diameter (emergent trees), which is often the host tree are many kinds of orchids, are potentially reduce the availability of local seeds and endemic orchids, including reduced vegetation growth and spread of orchids species, thereby reducing the presence and abundance or even extinct. The condition is caused by environmental conditions around the host tree supporting orchids growth has started to not fit as a result of a sudden and sharp changes and will take place in the long run. Since the penetration of sunlight on the forest floor logged greater than in primary forest floor, causing the tree dries faster (Sutton, 1983; Mitchell, 1989).

3. Tree diameter distributions Host On Primary and Forest Used Forest Felling

Stem diameter which generally indicates the age, seems closely related to the number of epiphytes especially orchids that attach to a host tree species. Regardless of species, genera and families, host trees with relatively large diameters tend to be more attached orchids, both in number of species and number of individuals. With large diameter trees over most of the bark has a condition favorable for the growth of orchids, because his skin is generally rough, cracks and a lot of indentations, holes and broken branches or scars rotting (Mitchell. 1989).

However, it does not mean that every large diameter trees that although of the same type will always be more attached orchids, not even found at all (walter, 1993) for example on the type *Koompassia excelsa* and *Agathis borneensis* (or in kind by the host tree but canopy is damaged, molt and nearly bald or already bald).

Observations on Table 3, show that in primary forest around 59.9% of the host tree has a trunk diameter of 36-67 cm, and 5.4% of all host trees or 38 host tree has a diameter of more than 84 cm, while 175 trees host or 25.1% of the host tree has a diameter between 20-35 cm. In logged over area shows the host tree or about 49.3% of all host trees have a diameter between 20-35 cm, 186 host tree or approximately 30.0% of the host tree has a diameter between 36-51 cm, 89 host trees or around 21.1% of all host tree has a diameter between 52-67 cm, 19 host tree or approximately 15.3% of the host tree has a diameter between 68-83 cm, while 18 host tree, or about 3.3% of the host tree has a diameter of between 84 - 131 cm. And when comparing the host tree diameter distribution between primary forests to forests logged, then the average diameter of the host tree in the primary

forest is greater than the average diameter of host trees in logged-over forests. At logged-over area are most at between 20-51 cm diameter class and have not found the host tree with a diameter of 132 cm, because the tree trees with diameters over 100 cm was cut out and left more because of poor quality trees ("growing", disability, branch of branch-free trunk is too short, or curved) or trees of the species harvested are prohibited.

Table 3. Tree Diameter Distribution of Host Tree on Climax Forest (CF) and Log Over Area (LOA)

No.	Class of Diameter (cm)	CF		LOA	
		Sum	%	Sum	%
1.	20 – 35	175	25.1	301	49.3
2.	36 – 51	234	33.6	183	30.0
3.	52 – 67	183	26.3	89	21.1
4.	68 – 83	66	9.5	19	15.3
5.	84 – 99	21	3.0	12	2.3
6.	100 – 115	9	1.4	4	0.7
7.	116 – 131	3	0.4	2	0.3
8.	132 – 147	3	0.4	-	-
9.	148 – 163	1	0.1	-	-
10.	164 – 179	1	0.1	-	-
	T o t a l	696	100.0	610	100.0

Tree of life orchids (host) often have special physical appearance. Most of the host plants have branches, branches or twigs that growth is relatively flat or sloping habitats encountered groups of orchids. Surface of the skin on the slippery wood trees and hard, for example *Legerstroemia lanceolata*, *L. duperreans, Kompassia exelsa* and others, rare live orchids that grow well, so that orchids often found in trees that have a rough skin, cracked and grooved so easy to save water, for example *Ehritia acuminata, Sonneratia caseolaris, Pithecellobium scalare , Calophyllum inophyllum* and others (Claudio, R. 1999; Partomihardja, 1984). Conversely though environmental conditions, especially climatic elements strongly support the presence of orchids was never found in plants pioneer (Essen, 1996).

CONCLUSION

The results of this study, several conclusions can be drawn as logging activities have caused degradation number of individuals and number of orchids species. Although logging activities have been implemented 6 years,felling trees and looming large in diameter (emergent trees), which is often the host tree are many kinds of orchids, are potentially reduce the availability of local seeds and endemic orchids, including reduced vegetation growth and spread of orchids species, thereby reducing the presence and abundance or even extinct.

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