

# Tree Species Composition, Diversity and Structure in Tunas Logging Concession Area of Papua-Indonesia

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## Introduction

Present geography of New Guinea geological provinces are a product of interaction of three major tectonic plates (Ocean Pacific Plate, Continental Australian and Eurasian plates), a number of micro-continent and several arc island systems. Although development of these complex areas is still being debated among geologists (Polhemus, 2007), biologists are trying to construct a coherent geotectonic history of New Guinea and its biogeography patterns (Micaux, 1994; de Boer, 1995). However, scientific data of vegetation in western part of the island which is vulnerable to forest degradation and deforestation is poorly available.

## Objectives

Main objective is to identify forest characteristics in Stable Platform Tectonic Province in the south of New Guinea. Whilst specific objectives are to compare tree species composition, species diversity and forest structure between post-harvest forest and undisturbed forest.

## Study site

Figure 1. Location of study site at Tunas, Papua-Indonesia

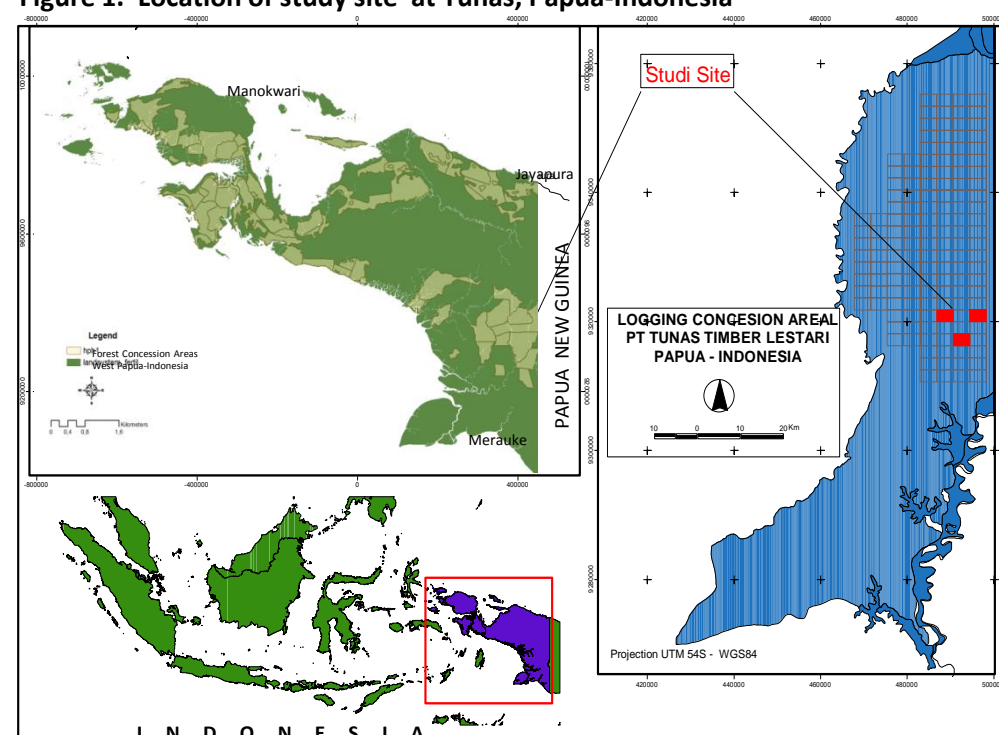
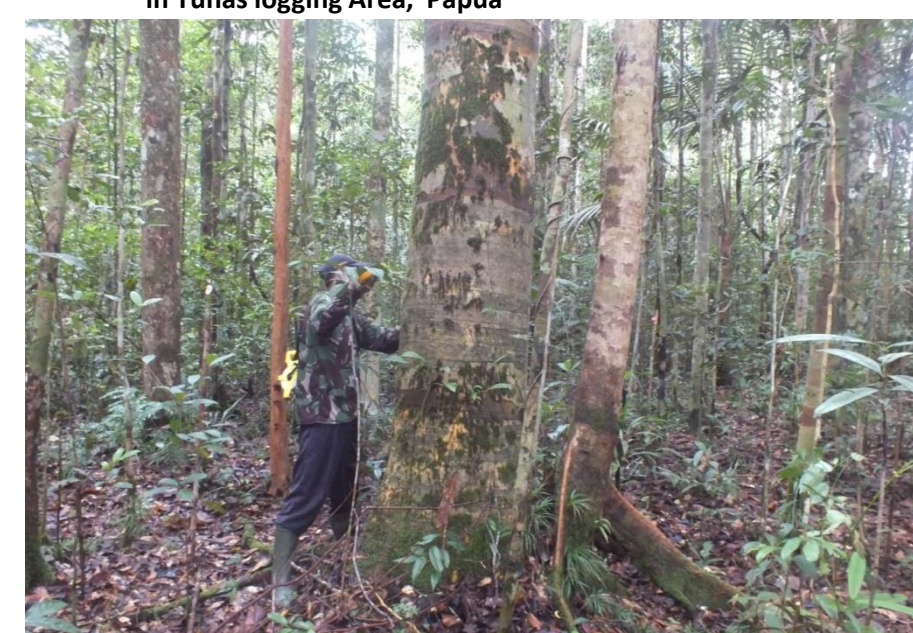


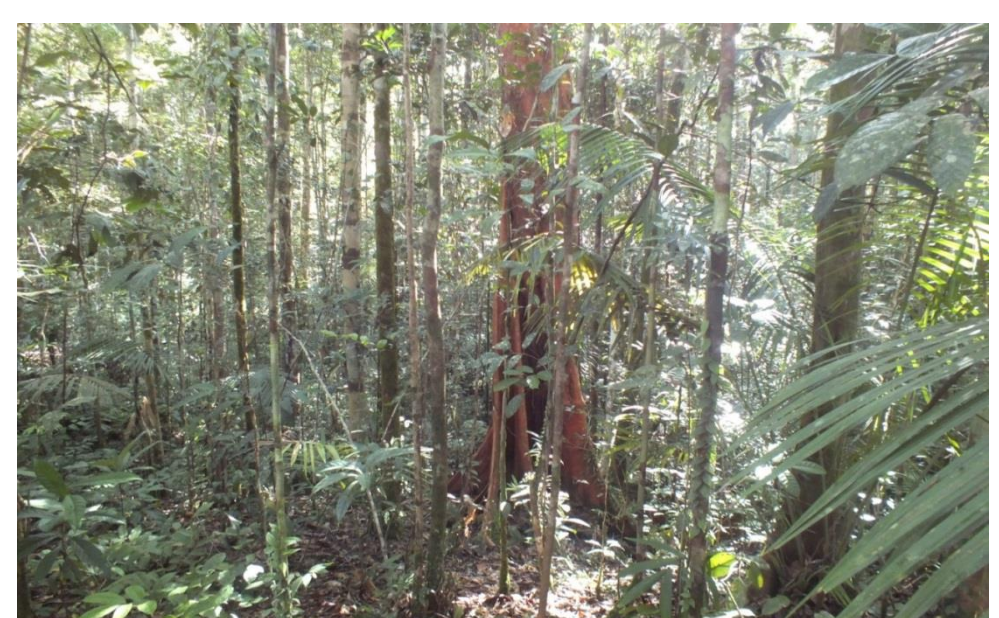
Figure 2. Three types of forest stands studied: (a) unlogged forest/ULG, (b) 4-year logged forest/LG4 and (c) 8-year logged forest/LG8 in Tunas logging Area, Papua



a. 70-cm dbh of *Vatica rassak* in unlogged forest stand



b. Saplings and Poles grow after 4 years in ex-sit trial of logged forest stand



c. *Dillenia ovalifolia* surrounding by saplings and poles in 8-years logged forest stand

Figure 3. Aerial view of Tunas logging Concession Area of West Papua-Indonesia



Source: PT. Tunas Timber Lestari, Papua-Indonesia

## Results

Figure 4. Cumulative tree species-area curve for unlogged forest (ULG), 4-year (LG4) and 8-year (LG8) logged forest stands

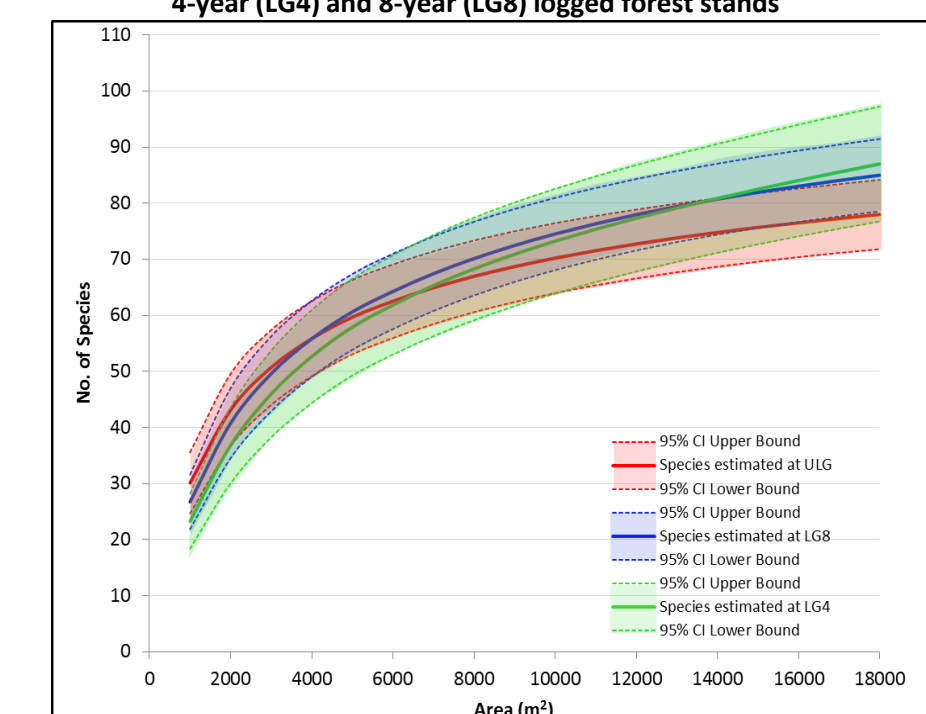
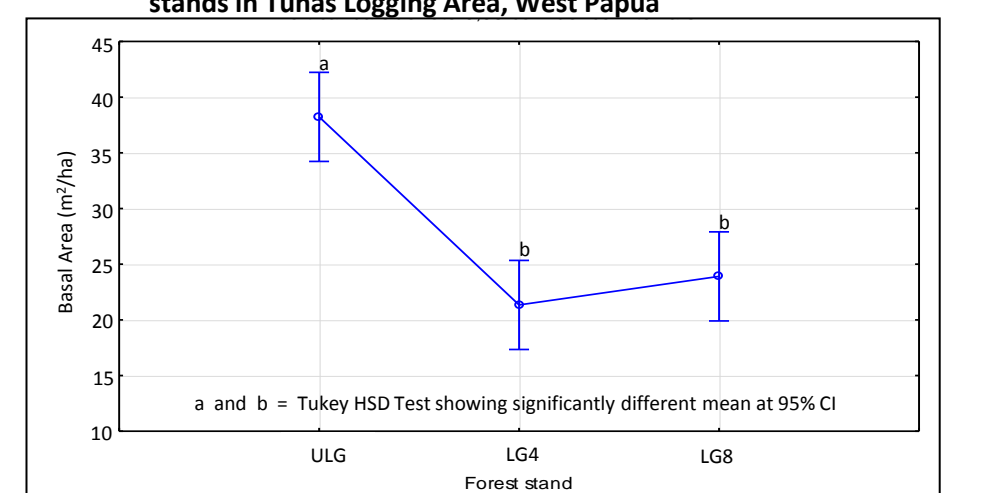


Table 1. Forest stand overview for unlogged (ULG), 4-year logged (LG4) and 8-year logged forest in Tunas Harvesting Area, West Papua

Forest Stands	ULG	LG4	LG8
Species No.	71	85	80
Abundance	1644	1049	1160
Basal Area (m <sup>2</sup> /ha)	38,23	21,34	23,90
Diameter of mean basal area (cm)	17,21	16,10	16,20

Figure 5. Tree's mean basal area of undisturbed and disturbed Forest stands in Tunas Logging Area, West Papua



## Tree species composition

Table 2. Five most important tree species with dbh>5cm ranked by their Important Value Index for ULG, LG4 and LG8 Forest stands in Tunas Logging Area, West Papua

Forest Stand ULG		Forest Stand LG4		Forest Stand LG8	
Scientific Name	Family	Scientific Name	Family	Scientific Name	Family
<i>Vatica rassak</i> Blume	Dipterocarpaceae	<i>Chisocheton ceramicus</i> C. DC.	Meliaceae	<i>Vatica rassak</i> Blume	Dipterocarpaceae
<i>Litsea timoriana</i> Span.	Lauraceae	<i>Vatica rassak</i> Blume	Dipterocarpaceae	<i>Litsea tuberculata</i> Boerl.	Lauraceae
<i>Syzygium anomalum</i> Ltrb.	Myrtaceae	<i>Litsea tuberculata</i> Boerl.	Lauraceae	<i>Canarium indicum</i> L.	Burseraceae
<i>Haplea papuana</i> Diels	Dipterocarpaceae	<i>Medusanthera polot</i>	Euphorbiaceae	<i>Medusanthera polot</i>	Euphorbiaceae
<i>Litsea tuberculata</i> Boerl.	Lauraceae	<i>Myristica sulcata</i> Warb.	Myristicaceae	<i>Myristica tubiflora</i> Blume	Myristicaceae

Table 3. Species similarity among Forest stands at different tree category in Tunas Logging Area, West Papua

Tree category	No. of species in ULG		No. of species in LG4		Percent similarity (Sørensen's coefficient)
	No. of species in ULG	No. of species in LG4	No. of species in ULG	No. of species in LG4	
Seedlings	31	26	17	17	59,65
Saplings	53	46	37	37	74,75
Poles	58	65	40	40	65,04
Trees	65	66	47	47	71,76

Table 4. Measure of species diversity at different tree category in Tunas Logging Area, West Papua

Tree category	Forest stands		
	ULG	LG4	LG8
	<b>Simpson's Diversity (D<sub>s</sub>)</b>		
Seedlings	0,81	0,94	0,84
Saplings	0,96	0,96	0,96
Poles	0,96	0,97	0,96
Trees	0,95	0,96	0,96
	<b>Shannon-Wiener Diversity (H')</b>		
Seedlings	2,35	3,04	2,47
Saplings	3,5	3,56	3,6
Poles	3,62	3,86	3,65
Trees	3,59	3,69	3,57
	<b>H<sub>max</sub> Diversity</b>		
Seedlings	3,43	3,26	3,43
Saplings	3,97	3,83	4,01
Poles	4,06	4,17	4,16
Trees	4,22	4,19	4,14
	<b>Evenness Diversity (E)</b>		
Seedlings	68,44	93,29	71,86
Saplings	88,19	92,99	89,85
Poles	85,09	92,46	87,73
Trees	85,04	87,96	86,05

## Forest structure

Figure 6. Observed and expected tree diameter distributions, from top left in clock direction, ULG, LG4, LG8 Forest stands and comparison of all expected diameter distribution for all stands in Tunas Logging Area, West Papua

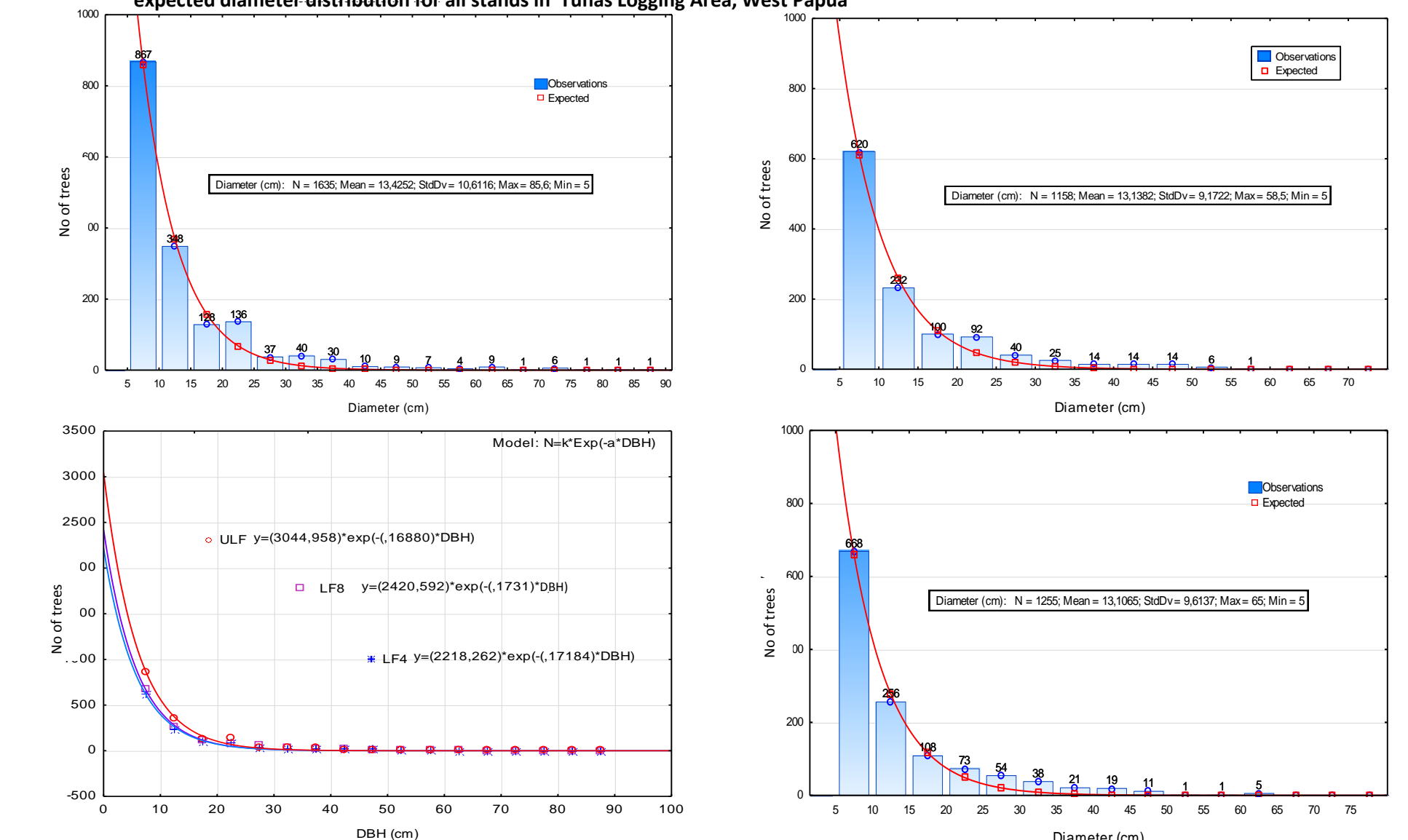
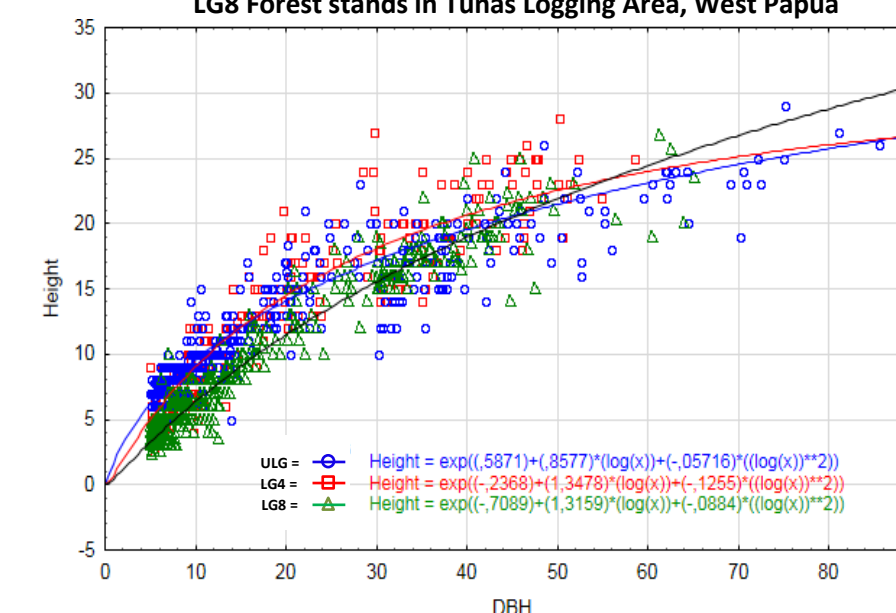


Figure 7. Tree diameter (dbh) – height relationship of ULG, LG4 and LG8 Forest stands in Tunas Logging Area, West Papua



## Acknowledgment:

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## Conclusions

Tunas Forest stands in Australian craton of New Guinea is mostly dominated by families of Dipterocarpaceae, Lauraceae and Myrtaceae among statistically estimated more than 30 families and 85 species found. Following logging, pioneer tree species of Moraceae were present causing slightly change in the species compositions as well as the forest structures. However, it is expected to be short-lived during first few years after cutting.