

Vegetation Composition at the Maleo Hungayono Sanctuary, Tulabolo Pinogu Resort, Bogani Nani Wartabone National Park

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Abstract: Understanding vegetation composition and structure in conservation areas is essential for establishing ecological baseline information to support effective forest management. This study aimed to characterize the composition and structure of vegetation at the Maleo Hungayono Sanctuary, Tulabolo Pinogu Resort, Bogani Nani Wartabone National Park, Indonesia. A quantitative field survey was conducted in January 2024 using a multiple-plot sampling method across tree, pole, and sapling strata. Vegetation data were collected from five sampling plots and analyzed using density, relative density, frequency, relative frequency, dominance, relative dominance, and the Importance Value Index (IVI). The survey identified 22 plant species representing 20 families. At the tree stratum, *Cananga orodata* exhibited the highest relative density (25.71%), whereas *Ficus variegata* recorded the highest relative dominance (32.04%) and IVI (55.85%). At the pole stratum, *Kleinhovia hospital* L. was the most structurally prominent species, with an IVI of 123.04%. The same species also dominated the sapling stratum, recording an IVI of 92.24%. These findings demonstrate differences in species dominance across vegetation strata and provide baseline ecological information on forest vegetation composition and structure within the sanctuary. The results may serve as a reference for vegetation monitoring and the development of site-specific forest management strategies.

Keywords: *vegetation composition; forest structure; Importance Value Index; vegetation analysis; Maleo Hungayono Sanctuary*

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INTRODUCTION

Vegetation comprises plant species that grow together in a particular area and interact with one another and with other organisms in their environment (Ulfiza et al., 2018). Plants remove atmospheric carbon dioxide (CO₂) through photosynthesis and store carbon in their tissues (Nurhaidah et al., 2022). Carbon is subsequently transferred among different carbon pools as part of the carbon cycle (Oktaviani et al., 2017). Vegetation therefore contributes to environmental quality and ecosystem functioning. Vegetation analysis is an ecological approach used to characterize plant communities and examine their composition and structure through field observations (Ulfiza et al., 2018).

Vegetation structure describes the vertical and horizontal organization of plants in a community.

Vegetation may include trees, poles, saplings, seedlings, climbers, epiphytes, and understory plants. These plants coexist and interact with one another and with other organisms, forming a dynamic ecological system (Azizah, 2023).

Vegetation contributes to ecosystem functioning at multiple scales. It helps regulate atmospheric carbon dioxide and oxygen, influences the physical, chemical, and biological properties of soil, affects water infiltration and groundwater conditions, and can reduce erosion. The role of vegetation in mitigating erosion and landslides depends on evapotranspiration, infiltration, soil-moisture conditions, topography, species composition, growth form, stand structure, and spatial distribution (Hamidun, 2015).

Indonesian forests play an important role in maintaining global ecological systems (Baderan, 2017). Forests are renewable natural resources that support the lives of many organisms and provide essential ecosystem functions. Indonesian Law No. 41 of 1999 on Forestry defines a forest as an ecosystem unit consisting of a land area containing biological natural resources, dominated by trees in their natural environment, in which the components are interdependent. Forest health is important because forest functions depend partly on the condition of the trees that form the stand (SM et al., 2024). Forest use is permissible only when the forest's functions are taken into account (Naniu et al., 2021).

A forest community is a dynamic ecological system that develops through processes such as plant establishment, adaptation, aggregation, competition, and changes in dominance in response to site conditions (Soerianegara & Indrawan, 2005). Forest communities change over time. For example, when trees fall or die, gaps form in the canopy and allow more sunlight to reach the forest floor. Natural processes may subsequently alter community structure. Forest vegetation composition reflects interactions among biotic and abiotic components. Vegetation structure refers to the spatial arrangement of individuals within a stand (Destaranti et al., 2017). Community structure can be quantified using density, frequency, dominance, and the Importance Value Index (IVI), which combines relative density, relative frequency, and relative dominance (Rahim & Baderan, 2019).

Information on vegetation is important for developing forest-management strategies. Common parameters include density (the number of individuals per unit area), frequency (the proportion of sampled plots in which a species occurs), dominance (often represented by the basal area of a species relative to the total basal area), and the Importance Value Index (IVI). For tree vegetation, IVI is calculated as the sum of relative density, relative frequency, and relative dominance and is used to describe the ecological importance of a species within the sampled community.

METHOD

The study was conducted in January 2024 at the Maleo Hungayono Sanctuary, within Bogani Nani Wartabone National Park. The equipment included a 20-m measuring tape, raffia string, stationery, a camera, a GPS receiver, a clinometer, a pH meter, a digital lux meter, and a digital hygrometer.

Primary data were collected through field surveys in sampling plots. The recorded variables included local species names, the number of individuals, and diameter at breast height (DBH). Sampling was non-destructive. Vegetation was classified into tree, pole, and sapling strata, and stem diameters were measured to calculate vegetation parameters. The study area covered 2 ha. A sampling intensity of 10% was used, corresponding to 0.2 ha (2,000 m²). Plot sizes were 20 m × 20 m (400 m²) for trees, 10 m × 10 m (100 m²) for poles, and 5 m × 5 m (25 m²) for saplings. Five plots were reported for the tree stratum.

Diameter and height were measured for trees and poles. Individuals that could not be identified in the field were photographed, including their leaves, fruits, or flowers, and identified subsequently. Herbarium specimens were not collected because specimen collection was not permitted within the conservation area. The data were analyzed quantitatively to describe species composition and stand structure. Basal area (BA) was calculated as $BA = (\pi/4) \times D^2$, where D is stem diameter, following Kusmana (1997). The following parameters were calculated:

Density = Number of individuals of a species / Total sampled area (ha)

Relative density = (Density of a species / Total density of all species) × 100%

Frequency = Number of plots containing a species / Total number of plots

Relative frequency = (Frequency of a species / Sum of frequencies of all species) × 100%

Dominance = Total basal area of a species / Total sampled area
Relative dominance = (Dominance of a species / Total dominance of all species) × 100%
IVI = Relative density + Relative frequency + Relative dominance

FINDINGS AND DISCUSSION

Vegetation composition of tree stands

The vegetation survey covered five plots at the Maleo Hungayono Sanctuary in Bogani Nani Wartabone National Park. A total of 22 tree species representing 20 families were recorded at the study site. Their taxonomic classifications are presented in Table 1.

Table 1. Taxonomic identification of tree species recorded at the study site

No.	Division	Class	Order	Family	Genus	Species
1	Magnoliophyta	Magnoliopsida	Urticales	Moraceae	Ficus	<i>Ficus variegata</i>
2	Magnoliophyta		Magnoliales	Annonaceae	Cananga	<i>Cananga orodata</i>
3	Tracheophyta		Lamiales	Lamiaceae	Vitex	<i>Vitex copassus</i>
4	Magnoliophyta		Sapindales	Burseraceae	Garuga	<i>Garuga floribunda</i>
5	Magnoliophyta		Malpighiales	Achariaceae	Pangium	<i>Pangium edule</i>
6	Magnoliophyta		Vioales	Datisceae	Octomeles	<i>Octomeles sumantrana</i>
7	Magnoliophyta		Sapindales	Sapindaceae	Pometia	<i>Pometia pinnata</i>
8	Tracheophyta		Malvales	Streuliaceae	Pterocymbium	<i>Pterocymbium javanicum</i>
9	Tracheophyta		Arecales	Aracaceae	Arenga Labill.	<i>Arenga pinnata</i>
10	Magnoliophyta		Sapindales	Anacardiaceae	Dracontomelon	<i>Dracontomelon dao</i>
11	Magnoliophyta		Ebenales	Ebenaceae	Diospyros	<i>Diospyros celebica</i>
12	Magnoliophyta		Ebenales	Saptaceae	Palaquium	<i>Palaquium obovatum</i>
13	Magnoliophyta		Myrtales	Myrtaceae	Syzygium	<i>Syzygium litorale</i>
14	Magnoliophyta		Rosales	Urticaceae	Dendrocnide	<i>Dendrocnide microstigma</i>
15	Magnoliophyta		Malpighiales	Euphorbiaceae	Endospermum	<i>Endospermum peltatum</i>
16	Magnoliophyta		Gentianales	Rubiaceae	Tricalysia	<i>Tricalysia singularis</i>
17	Magnoliophyta		Malpighiales	Euphorbiaceae	Pimelodendron	<i>Pimelodendron ambonicum</i>
18	Magnoliophyta		Magnoliales	Magnoliaceae	Magnolia	<i>Magnolia champaka L.</i>
19	Magnoliophyta		Magnoliales	Myristicaceae	Horsfieldia	<i>Horsfieldia bivalvis</i>
20	Tracheophyta		Malvales	Sterculiaceae	Kleinhovia	<i>Kleinhovia hospital L.</i>
21	Magnoliophyta		Ericales	Lecythidaceae	Planchonia	<i>Planchonia valida</i>
22	Tracheophyta		Malvales	Malvaceae	Sterculia	<i>Sterculia insularis</i>

Source: Field data, 2024.

The survey recorded 22 tree species belonging to 20 families at the Maleo Hungayono Sanctuary (Table 2). Species composition describes the species present in a community and their representation within it. Forest vegetation composition may change in response to natural disturbances and human activities and reflects interactions among organisms and environmental conditions.

Table 2. Tree species composition at the maleo hungayono sanctuary by vegetation stratum

No.	Local name	Scientific name	Tree	Pole	Sapling
1	Tapeo	<i>Ficus variegata</i>	√		
2	Kenanga	<i>Cananga orodata</i>	√	√	√
3	Gufasa	<i>Vitex copassus</i>		√	
4	Kayu Kambing	<i>Garuga floribunda</i>	√		√
5	Pangi	<i>Pangium edule</i>	√	√	√
6	Binuang	<i>Octomeles sumantrana</i>	√		
7	Matoa	<i>Pometia pinnata</i>	√		√
8	Bayur	<i>Pterocymbium javanicum</i>		√	
9	Aren	<i>Arenga pinnata</i>	√		
10	Loyo	<i>Dracontomelon dao</i>	√		
11	Tolotio	<i>Diospyros celebica</i>	√	√	
12	Nantu	<i>Palaquium obovatum</i>	√		√
13	Lopuo	<i>Syzygium litorale</i>	√		
14	Sosoro	<i>Dendrocnide microstigma</i>	√		
15	Molomelu	<i>Endospermum peltatum</i>			√
16	Saria	<i>Tricalysia singularis</i>	√		
17	Ombupale	<i>Pimelodendron ambonicum</i>			√
18	Dahago	<i>Magnolia champaka L.</i>	√		√
19	Kayu Ba'a	<i>Horsfieldia bivalvis</i>	√	√	√
20	Mata Putih	<i>Kleinhovia hospital L.</i>	√	√	√
21	Bululungo	<i>Planchonia valida</i>		√	√
22	Tolutu	<i>Sterculia insularis</i>	√	√	√

Source: Field data, 2024.

The tree stratum comprised 35 individuals across five plots: 14 in Plot 1, 7 in Plot 2, 5 in Plot 3, 4 in Plot 4, and 5 in Plot 5 (Table 3).

Table 3. Tree-stratum composition by sampling plot

No.	Local name	Scientific name	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5
1	Tapeo	<i>Ficus variegata</i>	5				
2	Kenanga	<i>Cananga orodata</i>		5	2		2
3	Gufasa	<i>Vitex copassus</i>					
4	Kayu Kambing	<i>Garuga floribunda</i>				2	
5	Pangi	<i>Pangium edule</i>			1		
6	Binuang	<i>Octomeles sumantrana</i>	1				
7	Matoa	<i>Pometia pinnata</i>	2				
8	Bayur	<i>Pterocymbium javanicum</i>					
9	Aren	<i>Arenga pinnata</i>		1			
10	Loyo	<i>Dracontomelon dao</i>		1	1		
11	Tolotio	<i>Diospyros celebica</i>	1				
12	Nantu	<i>Palaquium obovatum</i>	1				
13	Lopuo	<i>Syzygium litorale</i>				2	
14	Sosoro	<i>Dendrocnide microstigma</i>					1
15	Molomelu	<i>Endospermum peltatum</i>					

16	Saria	<i>Tricalysia singularis</i>				1		
17	Ombupale	<i>Pimelodendron ambonicum</i>						
18	Dahago	<i>Magnolia champaka L.</i>	1					
19	Kayu Ba'a	<i>Horsfieldia bivalvis</i>						2
20	Mata Putih	<i>Kleinhovia hospital L.</i>	2					
21	Bululungo	<i>Planchonia valida</i>						
22	Tolutu	<i>Sterculia insularis</i>	1					
	Total individuals per plot		14	7	5	4	5	
	Overall total individuals		35					

Source: Field data, 2024.

The pole stratum comprised 32 individuals across five plots: 6 in Plot 1, 6 in Plot 2, 6 in Plot 3, 6 in Plot 4, and 8 in Plot 5 (Table 4).

Table 4. Pole-stratum composition by sampling plot

No.	Local name	Scientific name	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5
1	Tapeo	<i>Ficus variegata</i>					
2	Kenanga	<i>Cananga orodata</i>	1	3	1		2
3	Gufasa	<i>Vitex copassus</i>	1				
4	Kayu Kambing	<i>Garuga floribunda</i>					
5	Pangi	<i>Pangium edule</i>		1			
6	Binuang	<i>Octomeles sumantrana</i>					
7	Matoa	<i>Pometia pinnata</i>					
8	Bayur	<i>Pterocymbium javanicum</i>					1
9	Aren	<i>Arenga pinnata</i>					
10	Loyo	<i>Dracontomelon dao</i>					
11	Tolotio	<i>Diospyros celebica</i>					1
12	Nantu	<i>Palaquium obovatum</i>					
13	Lopuo	<i>Syzygium litorale</i>					
14	Sosoro	<i>Dendrocnide microstigma</i>					
15	Molomelu	<i>Endospermum peltatum</i>					
16	Saria	<i>Tricalysia singularis</i>					
17	Ombupale	<i>Pimelodendron ambonicum</i>					
18	Dahago	<i>Magnolia champaka L.</i>					
19	Kayu Ba'a	<i>Horsfieldia bivalvis</i>				2	
20	Mata Putih	<i>Kleinhovia hospital L.</i>	4	1	4	4	3
21	Bululungo	<i>Planchonia valida</i>			1		1
22	Tolutu	<i>Sterculia insularis</i>		1			
	Total individuals per plot		6	6	6	6	8
	Overall total individuals		32				

Source: Field data, 2024.

The sapling stratum comprised 26 individuals across five plots: 4 in Plot 1, 7 in Plot 2, 4 in Plot 3, 4 in Plot 4, and 7 in Plot 5 (Table 5).

Table 5. Sapling-Stratum Composition by Sampling Plot

No.	Local name	Scientific name	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5
1	Tapeo	<i>Ficus variegata</i>					
2	Kenanga	<i>Cananga orodata</i>		2			
3	Gufasa	<i>Vitex copassus</i>					
4	Kayu Kambing	<i>Garuga floribunda</i>		1			
5	Pangi	<i>Pangium edule</i>	1				2
6	Binuang	<i>Octomeles sumantrana</i>					
7	Matoa	<i>Pometia pinnata</i>	1				
8	Bayur	<i>Pterocymbium javanicum</i>					
9	Aren	<i>Arenga pinnata</i>					
10	Loyo	<i>Dracontomelon dao</i>					
11	Tolotio	<i>Diospyros celebica</i>					
12	Nantu	<i>Palaquium obovatum</i>		1			
13	Lopuo	<i>Syzygium litorale</i>					
14	Sosoro	<i>Dendrocnide microstigma</i>					
15	Molomelu	<i>Endospermum peltatum</i>					1
16	Saria	<i>Tricalysia singularis</i>					
17	Ombupale	<i>Pimelodendron ambonicum</i>					1
18	Dahago	<i>Magnolia champaka L.</i>		1			1
19	Kayu Ba'a	<i>Horsfieldia bivalvis</i>	1			2	
20	Mata Putih	<i>Kleinhovia hospital L.</i>		1	3	2	2
21	Bululungo	<i>Planchonia valida</i>	1		1		
22	Tolutu	<i>Sterculia insularis</i>		1			
Total individuals per plot			4	7	4	4	7
Overall total individuals			26				

Source: Field data, 2024.

Vegetation analysis

Vegetation analysis at the tree stratum

Abbreviations: BA = basal area; RD = relative density; RF = relative frequency; RDom = relative dominance; IVI = Importance Value Index.

Table 6. Vegetation analysis at the tree stratum

No.	Species	Individuals	Basal area	Relative density (%)	Relative frequency (%)	Relative dominance (%)	IVI
1	<i>Magnolia champaka L.</i>	1	0.05	2.86	4.76	4.83	12.45
2	<i>Sterculia insuaris</i>	1	0.02	2.86	4.76	1.60	9.22
3	<i>Palaquium obovatum</i>	1	0.04	2.86	4.76	4.71	12.33
4	<i>Kleinhovia hospital L.</i>	2	0.03	5.71	4.76	2.71	13.18
5	<i>Octomeles sumantrana</i>	1	0.02	2.86	4.76	1.84	9.46
6	<i>Pometia pinnata</i>	2	0.03	5.71	4.76	3.09	13.57
7	<i>Diospyros celebica</i>	1	0.01	2.86	4.76	1.07	8.69
8	<i>Ficus variegata</i>	5	0.30	14.29	9.52	32.04	55.85

9	<i>Cananga orodata</i>	9	0.15	25.71	14.29	15.54	55.54
10	<i>Arenga pinnata</i>	1	0.01	2.86	4.76	1.17	8.79
11	<i>Dracontomelon dao</i>	2	0.04	5.71	9.52	3.70	18.94
12	<i>Pangium edule</i>	1	0.02	2.86	4.76	1.84	9.46
13	<i>Tricalysia singularis</i>	1	0.02	2.86	4.76	2.47	10.09
14	<i>Syzygium litorale</i>	2	0.02	5.71	4.76	1.92	12.40
15	<i>Garuga floribunda</i>	2	0.03	5.71	4.76	3.28	13.76
16	<i>Dendrocnide microstigma</i>	1	0.06	2.86	4.76	6.41	14.03
17	<i>Horsfieldia bivalvis</i>	2	0.11	5.71	4.76	11.78	22.26
Total		35	0.95	100	100	100	300

Source: Field data, 2024.

At the tree stratum, *Cananga orodata* had the highest relative density (25.71%), with nine individuals recorded. The lowest relative density (2.86%) occurred among species represented by one individual each (Table 6). Relative density describes the proportion of individuals belonging to a species within the sampled stratum. *Cananga orodata* had the highest relative frequency in the tree stratum according to the reported analysis. Table 6 gives a relative-frequency value of 14.29% for this species. The lowest relative-frequency value shown in the table is 4.76% (Table 6).

Relative dominance represents the contribution of a species' basal area to the total basal area of the sampled community and indicates its structural prominence (Indriyanto, 2006). In Table 6, *Ficus variegata* had the highest relative dominance (32.04%), whereas *Diospyros celebica* had the lowest (1.07%). Species with larger stem diameters generally contribute more to basal area. Relative dominance is calculated by dividing a species' dominance by the total dominance of all recorded species and multiplying by 100%. At the tree stratum, *Ficus variegata* had the highest Importance Value Index (IVI; 55.85%) according to Table 6. *Diospyros celebica* had the lowest IVI in Table 6 (8.69%) and was represented by one individual. IVI describes a species' relative structural importance in the sampled community and should not be interpreted on its own as evidence of reproductive success or optimal habitat conditions (Hanafi et al., 2021).

Vegetation Analysis at the Pole Stratum

Table 7. Vegetation Analysis at the Pole Stratum

No.	Species	Individuals	Basal area	Relative density (%)	Relative frequency (%)	Relative dominance (%)	IVI
1	<i>Kleinhovia hospital L.</i>	16	0.04	50	29.41	43.63	123.04
2	<i>Cananga orodata</i>	7	0.03	21.875	23.53	33.02	78.43
3	<i>Vitex copassus</i>	1	0.00	3.125	5.88	1.46	10.47
4	<i>Sterculia insularis</i>	1	0.00	3.125	5.88	1.18	10.19
5	<i>Pangium edule</i>	1	0.00	3.125	5.88	2.47	11.48
6	<i>Planchonia valida</i>	2	0.00	6.25	11.76	3.79	21.81
7	<i>Horsfieldia bivalvis</i>	2	0.01	6.25	5.88	6.17	18.30
8	<i>Pterocymbium javanicum</i>	1	0.00	3.125	5.88	3.13	12.14
9	<i>Diospyros celebica</i>	1	0.00	3.125	5.88	5.14	14.15
Total		32	0.09	100	100	100	300

Source: Field data, 2024.

At the pole stratum, *Kleinhovia hospital L.* had the highest relative density (50%), with 16 individuals

recorded in Table 7.

The lowest relative-density value in the pole stratum was 3.13%; this value was reported for species represented by one individual each. Relative density alone is not sufficient to determine habitat condition (Table 7). Table 7 reports the highest relative frequency for *Kleinhovia hospital* L. (29.41%), followed by *Cananga orodata* (23.53%). The lowest relative-frequency value shown is 5.88%. At the pole stratum, *Kleinhovia hospital* L. had the highest relative dominance (43.63%), whereas *Sterculia insularis* had the lowest (1.18%) (Table 7). Relative dominance is calculated by dividing a species' basal area by the total basal area of all species and multiplying by 100%. At the pole stratum, *Kleinhovia hospital* L. had the highest IVI (123.04%) according to Table 7. *Sterculia insularis* had the lowest reported IVI. A high IVI indicates a relatively prominent structural role in the sampled community but does not, by itself, establish habitat suitability.

Vegetation analysis at the sapling stratum

Table 8. Vegetation analysis at the sapling stratum

No.	Species	Individuals	Basal area	Relative density (%)	Relative frequency (%)	Relative dominance (%)	IVI
1	<i>Horsfieldia bivalvis</i>	3	0.001418	11.54	10.53	10.61	32.67
2	<i>Planchonia valida</i>	2	0.000498	7.69	10.53	3.72	21.94
3	<i>Pangium edule</i>	3	0.001684	11.54	10.53	12.60	34.67
4	<i>Pometia pinnata</i>	1	0.000291	3.85	5.26	2.18	11.29
5	<i>Sterculia insularis</i>	1	0.000601	3.85	5.26	4.50	13.61
6	<i>Diospyros celebica</i>	1	0.000211	3.85	5.26	1.58	10.69
7	<i>Cananga orodata</i>	2	0.001157	7.69	5.26	8.66	21.61
8	<i>Garuga floribunda</i>	1	0.000247	3.85	5.26	1.85	10.96
9	<i>Kleinhovia hospital</i> L.	8	0.005402	30.77	21.05	40.42	92.24
10	<i>Magnolia champaka</i> L.	2	0.000664	7.69	10.53	4.97	23.19
11	<i>Endospermum peltatum</i>	1	0.000465	3.85	5.26	3.48	12.59
12	<i>Pimelodendron ambonicum</i>	1	0.000726	3.85	5.26	5.43	14.54
Total		26	0.013365	100	100	100	300

Source: Field data, 2024.

At the sapling stratum, *Kleinhovia hospital* L. had the highest relative density (30.77%), with eight individuals recorded in Table 8. The lowest relative-density value was 3.85%, for species represented by one individual each. Relative density alone is not a reliable indicator of habitat degradation. At the sapling stratum, *Kleinhovia hospital* L. had the highest relative frequency (21.05%) and was recorded in four plots. The lowest relative-frequency value was 5.26%, corresponding to species recorded in one plot (Table 8). At the sapling stratum, *Kleinhovia hospital* L. had the highest relative dominance (40.42%), while *Diospyros celebica* had the lowest value (1.58%) in Table 8. Relative dominance is based on each species' contribution to the total basal area of the sampled stratum.

At the sapling stratum, *Kleinhovia hospital* L. had the highest IVI (92.24%), indicating the largest relative contribution to vegetation structure in the sampled plots. IVI describes the relative role of a species within a community (Rawana et al., 2022). Table 8 reports the lowest IVI for *Diospyros celebica* (10.69%), represented by one individual. These values are structural indicators rather than direct evidence of habitat suitability or reproductive success.

The Importance Value Index is used to describe the relative role of plant species within a community. A species' occurrence may reflect its ability to persist under local habitat conditions, although this relationship should be interpreted alongside other ecological data (Hamidun & Baderan, 2014).

Environmental Conditions at the Maleo Hungayono Sanctuary

Table 9. Environmental conditions at the Maleo Hungayono sanctuary

Plot	Temperature (°C)	Light intensity (original unit: Cd)	Relative humidity (%)	pH
1	28.2	5285	99	6
2	28.8	5897	99	6.1
3	28.6	5198	91	6
4	29.3	5239	86	6.1
5	29.1	5500	84	6

Source: Field data, 2024.

Environmental conditions were measured in the five plots (Table 9). Temperatures ranged from 28.2 to 29.3 °C, light-intensity readings ranged from 5,198 to 5,897, relative humidity ranged from 84% to 99%, and pH ranged from 6.0 to 6.1.

CONCLUSION

The survey recorded 22 tree species belonging to 20 families at the Maleo Hungayono Sanctuary, Bogani Nani Wartabone National Park. The recorded species were *Ficus variegata*, *Cananga orodata*, *Vitex copassus*, *Garuga floribunda*, *Pangium edule*, *Octomeles sumantrana*, *Pometia pinnata*, *Pterocymbium javanicum*, *Arenga pinnata*, *Dracontomelon dao*, *Diospyros celebica*, *Palaquium obovatum*, *Syzygium litorale*, *Dendrocnide microstigma*, *Endospermum peltatum*, *Tricalysia singularis*, *Pimelodendron ambonicum*, *Magnolia champaka*, *Horsfieldia bivalvis*, *Kleinhovia hospital L.*, *Planchonia valida*, and *Sterculia insularis*. Based on the reported results, *Ficus variegata* had the highest IVI at the tree stratum, while *Kleinhovia hospital L.* had the highest IVI at the pole and sapling strata. The findings provide baseline information on vegetation composition and structure at the sanctuary.

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