COMPOSITION AND STRUCTURE VEGETATION OF LOWANG GALI TOURISM FOREST, EAST LOMBOK REGENCY

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ARTICLE INFO

Article history

Received 04th of Sept., 2020

Revised 10th of Sept, 2020

Accepted 13th of Oct, 2020

Published 12th of Nov, 2020

Keywords

Lowang Gali Tourism -Forest

Important Value Index

East Lombok Regency

Composition

Vegetation Structure

ABSTRACT

The composition and structure of vegetation is one way to determine the level of control and distribution of a habitat, including in Lowang Gali forest tourism which has the potential as an educational tourism area in East Lombok Regency. Based on the observations, there were 14 families with 22 species of woody plants. The moraceae family is the family with the largest number of species, consisting of 5 (five) ficus genera, namely: *Ficus racemosa*, *Ficus salicifolia*, *Ficus variegata*, *Ficus sur* and *Ficus seftica*. Based on the results of data analysis, the highest Important Value Index for seedlings was *Ficus seftica* (23,39%), the highest sapling was *Alstonia scholaris* (19,80%), the highest pile strata was *Dysoxylum gaudichadianun* (50,44%) and tree strata. the highest were *Alstonia scholaris* (45,15%) and *Dysoxylum gaudichadianun* (45,15%). The index value of plant species diversity in the Lowang Gali forest tourism area is more than 1 ($1 \leq H' \leq 3$) which indicates moderate diversity.

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A. INTRODUCTION

Indonesia is one of the countries that have a high biodiversity, among which there are 17% of the total number of flora and fauna scattered throughout the world, this is evidenced by Indonesia is the seventh-largest country with 20,000 species, 40% of which are endemic to Indonesia Kusmana and Istomo, (1995). The high level of biodiversity in Indonesia can be attributed to Indonesia being a tropical country so that flora and fauna can easily adapt and do not have severe barriers to growth and development. Apart from that, it is supported by Indonesia's geographical location which is on the equator.

One of the islands that have natural resources rich in flora and fauna is the island of Lombok, West Nusa Tenggara Province. Lombok Island is one of the islands in the small Sundanese region which has lowland tropical rainforest and semi-evergreen rain areas such as the Mount Rinjani National Park (TNGR) forest area (Monk et al., 1997). One of the natural potentials that have high diversity on the island of Lombok is the Lowang Gali

tourism forest located in the village of Ramban Biak, Lenek District, East Lombok Regency. Lowang Gali Tourism is a forest area that is used as a natural tourism and educational tour.

The potential for vegetation diversity in the Lowang Gali forest tourism is one of the important factors for educational tourism besides the potential for natural tourism that is presented, but until now there has been no research related to the inventory of plant species diversity, so this research is the first step in exploring the potential for educational tourism.

B. METHOD

1. Time and Place of Research

This research was conducted in July-August 2020 in the forest tourism area of Lowang Gali, Ramban Biak village, Lenek district, East Lombok Regency, with a research area of ± 13 hectares (**Figure 2.1**).

Figure 2.1. The Research Location Of The Lowang Gali Forest Tourism Area, East Lombok

2. Tools and Materials

The tools used in this study were raffia ropes, stakes, tape measure, GPS, label paper, plastic samples, cameras, stationery and sample rulers. Meanwhile, the ingredients needed are leaves, flowers, and plant fruit as identification materials.

3. Research Methods

Observation and data collection of vegetation were carried out using the randomized plot method by making different quadrants for each plant strata (**Figure 2.2**), namely: strata seedlings at 2x2m size, saplings strata at 5x5m size, poles strata at 10x10m size, and trees at quadrant size 15x15m. The number of observation and measurement quadrant plots was 25 sample plots.

Figure 2.2. Research Metrics

$$\text{Frequency} = \frac{\text{The number of tiles containing a type}}{\text{The number of observation quadrant plots}}$$

$$\text{Relative frequency} = \frac{\text{Frequency of kind}}{\text{Frequency of all kind}} \times 100\%$$

$$\text{Density} = \frac{\text{Number of individual}}{\text{Quadrant plot area}}$$

$$\text{Relative density} = \frac{\text{One type density}}{\text{All of type density}} \times 100\%$$

$$\text{Base area} = \frac{1}{4} \cdot \pi \cdot D^2$$

$$\text{Dominance} = \frac{\text{The base area of one type}}{\text{The total area of the sample plot}}$$

$$\text{Relative dominance} = \frac{\text{The cover of type}}{\text{All of the cover types}} \times 100\%$$

$$\text{Importance Value Index} = \text{Relative frequency} + \text{Relative density} + \text{Relative dominance}$$

The diversity index is determined using the Shannon-Wiener formula, namely

$$H' = - \sum P_i \ln P_i$$

Information:

H' = diversity index

$P_i = n_i / N$

n_i = density

N = density of all species

Shannon-Wiener diversity assessment criteria (Restu, 2002)

1. If the value of $H' < 1$, indicates that the diversity is small.
2. If the value of $1 < H' < 3$, it indicates that the diversity is moderate.
3. If the value of $H' > 3$, it shows that the diversity is high.

C. RESULTS AND DISCUSSION

Composition of Plant Types Based on the observations, it was found 14 families with a total of 22 species of woody plants in Lowang Gali forest tourism (**Table 3.1**). The moraceae family is the family with the largest number of species, consisting of 5 (five) ficus genera, namely: *Ficus racemosa*, *Ficus salicifolia*, *Ficus variegata*, *Ficus sur* and *Ficus seftica*. The number of ficus clans found than other genera can be caused by tourism in the Lowang Gali forest in lowland areas, this is supported by Nur'aini et al., (2013)

report that most species of the genus *Ficus* are found in tropical areas and grow well in lowland areas.

Table 3.1. Composition of Lowang Gali forest tourism plant species

No	Species	Seedling	Sapling	Pole	Tree
1	<i>Alstonias cholaris</i>	✓	✓	✓	✓
2	<i>Azadirachta indica</i>	✓	-	✓	✓
3	<i>Barringtonia racemosa</i>	✓	✓	✓	✓
4	<i>Brugmansia</i> sp	✓	✓	-	-
5	<i>Calophyllum inophyllum</i>	✓	✓	✓	✓
6	<i>Ceiba speciosa</i>	-	✓	-	✓
7	<i>Dendrocnide stimulans</i>	✓	✓	✓	✓
8	<i>Dysoxylum gaudichadianum</i>	✓	✓	✓	✓
9	<i>Dysoxylum</i> sp	✓	✓	✓	✓
10	<i>Ficus racemosa</i>	✓	✓	✓	✓
11	<i>Ficus salicifolia</i>	-	-	✓	✓
12	<i>Ficus seftica</i>	✓	✓	✓	-
13	<i>Ficus sur</i>	✓	✓	✓	-
14	<i>Ficus variegata</i>	✓	✓	✓	✓
15	<i>Gmelina arborea</i>	-	✓	✓	✓
16	<i>Leucaena</i> sp	✓	✓	-	-
17	<i>Salix tetrasperma</i>	✓	✓	-	✓
18	<i>Shorea macrophylla</i>	-	✓	✓	✓
19	<i>Shorea</i> sp	✓	-	✓	✓
20	<i>Sumbucus javanica</i>	✓	✓	-	-
21	<i>Syzygium aqueum</i>	✓	✓	-	-
22	<i>Tabernaemontana sphaeracarpa</i>	✓	✓	✓	-

In contrast to the composition of the forest vegetation in the Gunung Rinjani National Park (TNGR) that the dominant species are *Pterospermum javanicum*, *Syzygium* sp and *Antidesma* sp namely the TNGR area is a highland habitat while Lowang Gali Tourism is in the lowlands.

The important value index is one way of calculating the level of mastery of a research object which can be in the form of plants (Rahman et al., 2018). The index of a forest vegetation is highly dependent on habitat conditions which can be influenced by environmental factors so that certain types that can survive, grow and develop well can be seen from the Important Value Index of the types of field observations and data analysis (Rahman et al., 2019). Based on the results of field observations and data analysis (**Table 3.2**), the highest Important Value Index in the seedling strata was *Ficus seftica* (23.39%). Lowland, this is in accordance with the topographical conditions of Lowang Gali Tourism which is a lowland so that it supports the process of growth and development, this is in accordance with the results of research by Nur'aini et al., (2013) in Prof. Soemirto Djojo Hadikusumo stated that *Ficus seftica* was the type with the highest Important Value Index for seedling strata.

While the lowest Important Value Index is the type of *Azadirachta indica* with an Important Value Index of 3.95%, this can be because *Azadirachta indica* is difficult to adapt to humid climates but can grow and develop well in dry areas (Ahmad and Grainge, 1985; Susila, 2014).

Table 3.2. Importance index for seedling strata

No	Species	Relative density (%)	Relative frequency (%)	Important Value Index (%)
1	<i>Alstonia scholaris</i>	9,09	7,317	16,41
2	<i>Azadirachta indica</i> A. Juss	1,51	2,43	3,95
3	<i>Barringtonia racemosa</i>	3,03	4,87	7,91
4	<i>Brugmansia</i> sp	3,03	2,43	5,47
5	<i>Calophyllum inophyllum</i>	3,03	7,31	10,35
6	<i>Dendrocnide stimulans</i>	3,03	2,43	5,47
7	<i>Dysoxylum gaudichadianum</i>	12,12	9,75	21,88
8	<i>Dysoxylum</i> sp	3,03	2,43	5,47
9	<i>Ficus racemosa</i>	3,03	4,87	7,91
10	<i>Ficus seftica</i>	13,63	9,75	23,39
11	<i>Ficus sur</i>	10,60	7,31	17,92
12	<i>Ficus variegata</i>	7,57	7,31	14,89
13	<i>Leucaena</i> sp	4,54	4,87	9,42
14	<i>Salix tetrasperma</i>	3,03	2,43	5,47
15	<i>Shorea</i> sp	4,54	4,87	9,42
16	<i>Sumbucus javanica</i>	7,57	7,31	14,89
17	<i>Syzygium aqueum</i>	3,03	4,87	7,91
18	<i>Tabernamontana sphaeracarpa</i>	4,54	7,31	11,86
Total		100	100	200

Table 3.3. Importance value index for saplings strata

No	Species	Relative density (%)	Relative frequency (%)	Important Value Index (%)
1	<i>Alstonia scholaris</i>	8,92	10,8	19,80
2	<i>Barringtonia racemosa</i>	3,57	4,34	7,92
3	<i>Brugmansia</i> sp	5,35	4,34	9,70
4	<i>Calophyllum inophyllum</i>	3,57	2,17	5,74
5	<i>Ceiba speciosa</i>	3,57	4,34	7,91
6	<i>Dendrocnide stimulans</i>	7,14	6,52	13,66
7	<i>Dysoxylum gaudichadianum</i>	5,35	6,52	11,88
8	<i>Dysoxylum</i> sp	7,14	4,34	11,49
9	<i>Ficus racemosa</i>	1,78	2,17	3,96
10	<i>Ficus seftica</i>	7,14	4,34	11,49
11	<i>Ficus sur</i>	5,35	6,52	11,88
12	<i>Ficus variegata</i>	7,14	4,34	11,49
13	<i>Gmelina arborea</i>	3,57	4,34	7,919
14	<i>Leucaena</i> sp	7,14	8,69	15,84
15	<i>Salix tetrasperma</i>	5,35	4,34	9,70
16	<i>Shorea macrophylla</i>	1,78	2,17	3,96
17	<i>Sumbucus javanica</i>	7,14	8,69	15,84
18	<i>Syzygium aqueum</i>	3,57	4,34	7,92
19	<i>Tabernamontana sphaeracarpa</i>	5,35	6,52	11,88
Total		100	100	200

The highest Important Value Index in saplings strata is *Alstonia scholaris* with a value of 19.80% (**Table 3.3**), the interesting thing is the level of mastery of *Alstonia scholaris* is lower in the seedling strata compared to *Ficus seftica*, it can be assumed that *Alstonia scholaris* saplings need sufficient sunlight for growth and development. While the condition of the Lowang Gali Tourism habitat is shaded vegetation which causes the growth and development of *Alstonia scholaris* to be relatively slower, in contrast to *Alstoniascholaris* in the sapling strata that has begun to dominate with the highest

Important Value Index which can be due to the ability to receive sufficient light intensity without being blocked by other plants.

The highest Important Value Index for saplings strata is the type *Dysoxylum gaudichadianun* with a value of 50.44% (**Table 3.4**), the results of this study are different from the results of research conducted by Sofiah et al., (2013) low (5.62%), this proves that the ability to grow and adapt to the *Dysoxylum gaudichadianu* species is low in mountainous areas and conversely has the ability to grow and adapt well in lowland areas such as in the Lowang Gali forest tourism.

The lowest Important Value Index for pole strata was *Gmelina arbore* and *Azadirachta indica* with the same value, namely 7.86%. Factors that can cause the low Important Value Index of *Gmelina arbore* can be due to limiting factors for growth and development in the growing habitat, such as high humidity, while *Gmelina arbore* growth can grow and develop well in real dry season habitat conditions (Sukriati, 2018). The difference in the Important Value Index of *Dysoxylum gaudichadianu* and *Gmelina arbore* which is quite significant, it can be assumed that the nature and ability to adapt affects the level of presence (frequency) of a plant species, because one of the major factors of Important Value Index is presence, where the presence of a species indicates the ability to adapt to the habitat and a wide tolerance for the environment (Hidayat, 2018).

Table 3.4. Importance Value Index For Poles Strata

No	Species	Relative density (%)	Relative frequency (%)	Relative dominance (%)	Important Value Index (%)
1	<i>Alstonia scholaris</i>	9,37	10,00	12,42	31,79
2	<i>Azadirachta indica</i>	3,12	3,33	1,405	7,86
3	<i>Barringtonia racemosa</i>	6,25	6,66	8,976	21,89
4	<i>Calophyllum inophyllum</i>	3,12	3,33	1,835	8,294
5	<i>Dendrocnide stimulans</i>	6,25	6,66	2,438	15,35
6	<i>Dysoxylum gaudichadianun</i>	12,50	13,33	24,61	50,44
7	<i>Dysoxylum</i> sp	6,25	6,66	3,728	16,64
8	<i>Ficus racemosa</i>	3,12	3,33	2,868	9,32
9	<i>Ficus salicifolia</i>	3,12	3,33	1,835	8,29
10	<i>Ficus seftica</i>	6,25	6,66	2,81	15,73
11	<i>Ficus sur</i>	9,37	10,00	8,661	28,04
12	<i>Ficus variegata</i>	12,50	6,66	11,16	30,32
13	<i>Gmelina arborea</i>	3,12	3,33	1,405	7,86
14	<i>Shorea macrophylla</i>	3,12	3,33	2,868	9,32
15	<i>Shorea</i> sp	6,25	3,33	8,288	17,87
16	<i>Tabernamontana sphaeracarpa</i>	6,25	10,00	4,703	20,95
Totals		100	100	100	300

Plants with tree strata are rarely found in the Lowang Gali forest tourism. This is due to the expansion of the tourism area so that the trees are old, so that from all the observation plots found tree strata as many as 34 stands. The highest Important Value Index of tree strata is *Alstonia scholaris* (45.15%) and *Dysoxylum gaudichadianun* (45.15%) (**Table 3.5**), this proves that the two types are able to compete, grow and adapt well to the Lowang Gali forest tourism area. Diversity Index of Plant Species The index value of the diversity of the vegetation strata of Lowang Gali forest tourism shows a value of more than 1 (> 1), namely the diversity value of the seedlings strata of 2,707, sapling strata of 2,869, pole strata of 2,653 and tree strata of 2,548 (**Table 3.6**). The results of the

research and calculations show that the vegetation of the Lowang Gali forest tourism is in moderate diversity.

Table 3.5. Importance Value Index For Trees Strata

No	Species	Relative density (%)	Relative frequency (%)	Relative dominance (%)	Important Value Index (%)
1	<i>Alstonia scholaris</i>	14,72	15,15	15,28	45,15
2	<i>Azadirachta indica</i>	2,943	3,03	2,392	8,365
3	<i>Barringtonia racemosa</i>	11,77	12,12	10,09	33,99
4	<i>Calophyllum inophyllum</i>	2,943	3,03	2,392	8,365
5	<i>Ceiba speciosa</i>	2,943	3,03	2,392	8,365
6	<i>Dendrocnide stimulans</i>	5,887	6,061	5,869	17,82
7	<i>Dysoxylum gaudichadianum</i>	14,72	15,15	15,28	45,15
8	<i>Dysoxylum</i> sp	8,83	6,061	9,396	24,29
9	<i>Ficus racemosa</i>	5,887	6,061	6,248	18,19
10	<i>Ficus salicifolia</i>	5,887	6,061	5,491	17,44
11	<i>Ficus variegata</i>	5,887	6,061	7,15	19,1
12	<i>Gmelina arborea</i>	2,943	3,03	2,745	8,719
13	<i>Salix tetrasperma</i>	5,887	6,061	6,65	18,6
15	<i>Shorea macrophylla</i>	5,887	6,061	5,869	17,82
16	<i>Shorea</i> sp	2,943	3,03	2,745	8,719
Total		100,1	100	100	300,1

Table 3.6. Diversity Index Of Plant Species

No	Species	Seedling	Sapling	Pole	Tree
1	<i>Alstonia scholaris</i>	0,218	0,216	0,222	0,282
2	<i>Azadirachta indica</i>	0,063	0	0,108	0,104
3	<i>Barringtonia racemosa</i>	0,106	0,119	0,173	0,252
4	<i>Brugmansia</i> sp	0,106	0,157	0	0
5	<i>Calophyllum inophyllum</i>	0,106	0,119	0,108	0,104
6	<i>Ceiba speciosa</i>	0	0,119	0	0,104
7	<i>Dendrocnide stimulans</i>	0,106	0,189	0,173	0,167
8	<i>Dysoxylum gaudichadianum</i>	0,256	0,157	0,26	0,282
9	<i>Dysoxylum</i> sp	0,106	0,189	0,173	0,214
10	<i>Ficus racemosa</i>	0,106	0,072	0,108	0,167
11	<i>Ficus salicifolia</i>	0	0	0,108	0,167
12	<i>Ficus seftica</i>	0,272	0,189	0,173	0
13	<i>Ficus sur</i>	0,238	0,157	0,222	0
14	<i>Ficus variegata</i>	0,195	0,189	0,26	0,167
15	<i>Gmelina arborea</i>	0	0,119	0,108	0,104
16	<i>Leucaena</i> sp	0,141	0,189	0	0
17	<i>Salix tetrasperma</i>	0,106	0,157	0	0,167
18	<i>Shorea macrophylla</i>	0	0,072	0,108	0,167
19	<i>Shorea</i> sp	0,141	0	0,173	0,104
20	<i>Sumbucus javanica</i>	0,195	0,189	0	0
21	<i>Syzygium aqueum</i>	0,106	0,119	0	0
22	<i>Tabernamontana sphaeracarpa</i>	0,141	0,157	0,173	0
Total		2,707	2,869	2,653	2,548

D. CONCLUSION

The composition of Lowang Gali forest tourism is composed of 22 types consisting of 14 families. The highest Important Value Index for seedlings was *Ficus seftica* (23.39%), the highest Important Value Index for saplings was *Alstonia scholaris* (19.80%),

the highest Important Value Index for pole strata was *Dysoxylum gaudichadianun* (50.44%) and the highest Important Value Index for tree strata was *Alstonia scholaris* (45.15%) and *Dysoxylum gaudichadianun* (45.15%). The index value of plant species diversity in the Lowang Gali forest tourism area is more than 1 ($1 \leq H' \leq 3$) which indicates moderate diversity.

E. REFERENCES

- Hidayat, M. (2018). *Analisis Vegetasi Dan Keanekaragaman Tumbuhan Di Kawasan Manifestasi Geothermal Ie Suum Kecamatan Mesjid Raya Kabupaten Aceh Besar*. BIOTIK: Jurnal Ilmiah Biologi Teknologi Dan Kependidikan, 5(2), 114. <https://doi.org/10.22373/biotik.v5i2.3019>.
- Martono, D.S. 2012. *Analisis Vegetasi Dan Asosiasi Antara Jenis-Jenis Pohon Utama Penyusun Hutan Tropis Dataran Rendah di Taman Nasional Gunung Rinjani Nusa Tenggara Barat*. Madiun: Universitas Merdeka Madiun.
- Monk K.A, De Freetes Y, Liley GR. 1997. *The Ecology of Nusa Tenggara & Maluku*. Periplus, Hongkong.
- Nur'aini, Syamsuardi, & Arbain, A. (2013). *Tumbuhan Ficus L. (Moraceae) di hutan konservasi Prof. Soemitro Djojohadikusumo, PT. Tidar Kerinci Agung (TKA), Sumatera Barat*. Jurnal Biologi Universitas Andalas, 2(4), 235–241.
- Rahman, F. A., Qayim, I., & Wardiatno, Y. (2018). *Carbon storage variability in seagrass meadows of Marine Poton Bako, East Lombok, West Nusa Tenggara, Indonesia*. Biodiversitas, 19(5), 1626–1631. <https://doi.org/10.13057/biodiv/d190505>.
- Rahman F.A, Rohyani I.S, Suripto, Hadi, A.P, Lestari D.P. 2019. *Analisis Kualitas Perairan Terhadap Kemelimpahan Strata Pertumbuhan Vegetasi Mangrove Di Teluk Sereweh, Kabupaten Lombok Timur Nusa Tenggara Barat*. Jurnal Pendidikan Biologi Dan Sains (Penbios) 4 (2).
- Restu I.W. 2002. *Kajian Pengembangan Wisata Mangrove di Taman Hutan Raya Ngurah Rai Wilayah Pesisir Selatan Bali*. [Tesis]. Bogor: Program Pasca Sarjana, Institut Pertanian Bogor.
- Sofiah, S., Setiadi, D., & Widyatmoko, D. (2013). *Pola penyebaran, kelimpahan dan asosiasi bambu pada tumbuhan di Taman Wisata Alam Gunung Baung Jawa Timur*. Berita Biologi, 12(2), 239–247.
- Susila, I. W. W. (2014). *Potensi dan Tataniaga Mimba (Azadirachta indica A. Juss) di Lombok*. Jurnal Penelitian Hutan Tanaman, 12(2), 127–139. <https://doi.org/10.20886/jpht.2014.11.2.127-139>
- Kusmana C, Istomo. 1995. *Ekologi hutan*. Fakultas Kehutanan IPB. Bogor.