COMMUNITY PREFERENCES ON VEGETATION TYPE COMPOSITION KPHL TERNATE-TIDORE AREA, NORTH MALUKU

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Abstract

Community life depends on forest resources so it is necessary to maintain and increase the potential of the area for sustainable management, structure and composition The diversity of vegetation found in an area is principally a reflection of the interaction between various environmental factors and can change due to human activities.The purpose of this study is to determine the preferences and motivations of the community towards the composition of vegetation types and land use for community life. The method used is quantitative and qualitative analysis of the data from questionnaires, in-depth interviews and field observations. Based on the results of the analysis and field observations, the results are:Communities around the Ternate-Tidore KPHL area have a tendency to choose a planting model with an agoforestry pattern, namely utilizing yards with the highest percentage of 17% on Ternate Island, which can have a good impact on the environment, economy, and social community to improve community welfare. There are types of vegetation in the selected area that have the Important Value Index with the highest percentage in various classes of stands, including the Angsana species with INP (58,99%) for tree class, type of kluwih with INP (32.50%) on the pole class, type Musa balbisiana (Forest Banana) with an INP value of (50.15%) in the sapling class and in the seedling class, there are buston ferns with an INP Significant Value Index of (52.90%), and the level of diversity of vegetation types found in forest areas is found at the vegetation type at the seedling level. with a range of (1<H<3) which is the medium category with a value of (1.72), the diversity index of sapling vegetation species whose diversity is in the medium category is (H<3) with a value of (2.00), then the type of pole vegetation is also included the medium category with a value of (2.51) and tree-level vegetation types with a diversity index range also included in the medium category with a value of (1.89).

Keywords : vegetation, welfare, agroforestry

I. Introduction

Protected forests have the main function of protecting life support systems to regulate water systems, prevent flooding, control erosion, prevent seawater intrusion, and maintain soil fertility [1]. Changes in the composition and structure of forest vegetation are strongly influenced by disturbances, both natural and anthropogenic [2]. The diversity of vegetation in terms of structure and composition contained in an area is in principle a reflection of the interaction between various environmental factors and can change due to human activity factors [3]. Vegetation structure consists of vertical stratification which is a profile diagram depicting layers of trees, poles, seedlings and herbs that make up vegetation, horizon distribution of constituent species that describes the location of an individual to a type of community and the abundance of a type of community [4]. Vegetation describes the combination of various types of plants in an area or area, the structure of plant vegetation such as height, biomass and vertical and horizontal

heterogeneity, is an important factor affecting the flow of material and energy, as well as ecosystem diversity. Vegetation structure is the organization of individuals in space that forms a stand which is an extension of the vegetation type or plant association [5]. Species composition is the composition and number of species found in a plant community. Identification of species, number and arrangement is needed to determine the arrangement of forest stands.

Ecological restoration is defined as a process to assist the restoration of ecosystems that have been degraded, damaged or destroyed [6]. Ecological restoration is a relatively new concept in an effort to restore damaged ecosystem conditions. In contrast to the concept of forest rehabilitation which aims only to improve the function and productivity of the forest without having to compare it to the initial (original) condition when the forest has not been damaged, forest ecological restoration aims to restore the function, productivity, structure, and composition of the forest to its pre-forest state. [7]. The composition and structure of vegetation is one of the parameters that must be considered in forest restoration activities. Defines vegetation composition as a floristic list of the types of vegetation that exist in a community [8]. Defines the vegetation structure as the result of spatial planning by the components of stands and life forms, stratification, and vegetation cover which are described through diameter, height, spatial distribution, canopy diversity, and species continuity [9]. Further suggests that changes in the composition and structure of forest vegetation are strongly influenced by disturbances, both natural and anthropogenic. Vegetation analysis is a way of studying the arrangement and or composition of vegetation in the form (structure) of vegetation from a plant community, namely studying forest stands in the form of tree levels and their regeneration.

The rapid development of science and technology has greatly influenced the changes in the life of society, nation and state. Changes cause an increase in the necessities of life such as clothing, food and housing. The fulfillment of these needs affects human activities in managing and using land, because all these needs are related to land. This increasing demand and competition in land use requires careful thought and planning in making decisions about the most profitable use of limited land resources. Problems that arise in land use are common throughout the world, both in developed countries and in developing countries, especially when there is an increase in population and the process of industrialization [10]. The Ternate Island area has a high potential of biological natural resources, and is directly adjacent to the community. Small island area management activities must be carried out in a balanced manner by prioritizing aspects of the preservation of biological natural resources so that there are no ecological threats. Damage to the area is caused by several factors including, the occurrence of degradation, deforestation and human activities. Management of the area cannot be separated from the role of the relevant stakeholders. The purpose of this study was to determine the perception and motivation of the community towards the composition of vegetation types and the status of land use for community life.

II. Research methods

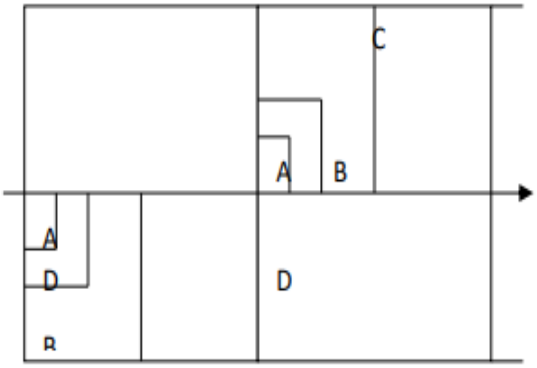
2.1. Location, Tool and Time of Research

This research was conducted in the Ternate-Tidore KPHL area, the forest area around the water source area on Ternate Island as a water absorption and conservation area.The location of the plots in the inventory is the Ternate-Tidore KPHL area which is close to Tongole Village, one of the villages located in Central Ternate District with its geographical location at 0°47'17" North Latitude and 127°21'16" East longitude. Tongole

Village is located in the vicinity of Mount Gamalama which has an altitude of ±300 - 400 meters above sea level and has an area of ±2.12 km2 with a very varied topography ranging from lowlands to mountains. Tools and materials used in the study, structure and composition Diversity of vegetation: The materials used in this research are area maps, field tools, GPS, haga meters, stationery and standard field equipment. The activity was carried out for 3 months (July - September 2019).

2.1. Data Retrieval Method

The method used is quantitative and qualitative analysis of the data from questionnaires, in-depth interviews and field observations. The vegetation taken as a sample is a type of wood that grows well based on the class of tree growth, namely weaning (seedling): from germination to a height of 150 cm, saplings: height > 150 cm, trunk circumference <10 cm, poles (polishing) trunk circumference 10-19 cm and tree >19 cm, according to the TPTI regulations in 1989/1993. The placement of measuring plots (PU), the placement of PU is done intentionally (pusposive sampling) with a combination method so that it can represent the condition of the stand, the combination method in question is a combination of the strip method and the plotted line method. The allowable error in this survey is 15% with an accuracy rate of 95%, then the number of PU 15 with a sampling intensity (IS) of 0.1%. Making a rectangular plot with an area of 0.04 hectares (20 mx 20 m) with Figure 1. Design of sample plots in the field using the combination method [11]. as follows:



Note: Plot A = size 2 mx 2 m for seedling level
Plot B = size 5 mx 5 m for stake level (sapling)
Plot C = size 10 mx 10 m for pole level (polished)
Plot D = size 20 mx 20 m For tree level (trees)

2.3. Vegetation Data Analysis

The vegetation data that has been collected is then analyzed to calculate the density, frequency or species dominance factor using the formula [12], as follows:

1. Density $= \frac{\sum \text{individu suatu jenis}}{\text{luas petak contoh}}$
2. Real Density $= \frac{\text{Kerapatan dari Suatu Jenis}}{\text{Kerapatanseluruhjenis}} \text{ x } 100\%$
3. Frequency $= \frac{\text{Jumlah Petak yang Terisi Suatu Jenis}}{\text{Jumlah seluru petak}}$
4. Relative Frequency $= \frac{\text{Frekuensi Suatu Jenis}}{\text{Frekuensi seluruh jenis}} \text{ x } 100\%$
5. Domination $= \frac{\sum \text{ Bidang Dasar Suatu Jenis}}{\text{Luas petak contoh}}$

6. Relative Dominance x 100% $= \frac{\text{Dominasi Dari Suatu Jenis}}{\text{Dominsai seluruh jenis}}$
7. Important Value Index =Real Density + Relative Frequency = 200%
8. Important Value Index = Real Density+Relative Frequency+ Relative Dominance= 300% (For level *stake, poles and trees)*
9. Diversity Index:

$$H = -\sum \left((\frac{n-i}{N}) + \log (\frac{n-i}{N} \right)$$

Information :
H = Shannon index = Shannon diversity index
ni = significance value of each species
N = Total Significant Value

III. Results and Discussion

3.1. General Condition of Research Site

The process of developing FMUs in North Maluku Province has been started since 2010. The Ternate-Tidore KPH was originally established based on the Decree of the Minister of Forestry Number: SK.73/menhut-II/2010 as KPHL unit XI of North Maluku. The general condition of the Ternate-Tidore KPHL area as a protection function, especially the plot that is used as a study location as a water catchment area, a more in-depth study is needed in order to determine the impact of damage or changes in vegetation composition because it is an area close to local community settlements, water catchment areas influenced by vegetation that grows in the area, damage to the water absorption area will have an effect on storing and absorbing water, if the capacity is less it will have an impact on flooding, on the other hand in the dry season there is less drought.

3.2. Diversification of Plant Types in the Region

Communities around the Ternate-Tidore KPHL area have increasing living needs, rapid population growth, as well as the narrowing of agricultural/plantation land, will have an impact on the lack of production of results so that several ways are needed to keep food needs fulfilled, many factors support the implementation of this diversification. , these factors are humans as implementers and nature as a means. Plant diversification carried out by the community in the following ways:

1. Plant diversification by replacing plant species to fulfill basic food needs. Communities around the area in addition to consuming rice/rice, have other staple foods such as corn, cassava (cassava), sweet potatoes, sago, taro.
2. Agricultural diversification with an intercropping system is to do a mixed planting system in one productive land, the use of other plants among the main crops is highly recommended, because in addition to increasing crop production, this planting system is also able to help plants resist pest attacks and also add nutrients to the crop. land.
3. Plant diversification using land with an agroforestry pattern, planting different plants is highly recommended while maintaining the natural balance of the forest. Protective trees should be maintained to maintain the water content in the soil.

Plant diversification is indeed carried out with the aim of being able to meet food needs for the community, this plant diversification is expected to continue and be able to

maintain the balance of nature and maintain agricultural land to remain productive, considering the limited agricultural land/plantation of the community around the KPHL area, it is necessary to innovate to increase production or various types of food crops to meet the food needs of the community, one of which is by diversifying plants which have been abandoned by farmers/communities. Utilization of yard land in households and lands that are not managed or utilized need to be a concern for related parties, one of which is through plant diversification, to increase production and types of food that are needed by the community.

3.3. Perception of Tree Planting Pattern

Public awareness is quite high on forests that their lives depend on forests, so forest resources need to be maintained and increased forest potential and manage them sustainably. Perception is a process in which a person becomes aware of everything in his environment through his senses, environmental knowledge is obtained throughinterpretation of sensory data [13]. Perception in terms of psychology is the process of planning information to be understood. The tool to obtain this information is sensing (sight, hearing, touch, and so on). Instead the tool to understand it is awareness or cognition. Agroforestry cropping patterns can have a good impact on the environment, economy, and social community to improve the welfare of the community. Communities around the Ternate-Tidore KPHL area have a tendency to choose the planting model of the agoforestry pattern,In the agroforestry system, there are several cropping patterns, including three strata cropping patterns, multistorey cropping, alley cropping, and so on [14]. One of the popular cropping patterns of agroforestry systems that have high productivity characteristics and can be applied to a wide range of environmental conditions is the aisle intercropping pattern or better known as Alley cropping, which is a method of maintaining sloping land by planting alleys or fences. We not only reduce the risk of erosion, but we also get other benefits from these alley plants, such as mulch (plant remnants that decompose very quickly and become land fertiliser), maybe even alley plants can be used as fodder for livestock, alley cropping is an agroforestry system that grows annual crops or food crops between alleys formed by hedges of trees or shrubs. The hedgerows are pruned periodically during planting to avoid shade and reduce nutrient competition with food crops/seasonal.

3.4. Household Motivation Against Tree Planting

Motivation is a psychological process that arises due to internal factors and external influences, internal factors can be in the form of personality, attitudes, experiences and education or various hopes and ideals that fight for the future. Motivation appears as a positive effort in directing the potential of the workforce productively to achieve and realize goals. Aspects of motivation can be interpreted as basic human needs that form the basis of expectations to fulfill what is expected [15] .Access to resources includes land use according to the proposed (Maslow, 1994) hierarchy of needs the main goal for the community is how they can meet their needs.In general, the use of yards shows that the people of Ternate Island tend to have 17% higher than the conditions of other island communities, namely 14% on Hiri Island and for the people of Tidore Island it has a value of 12% and the percentage for the use of Maitara Island yard land is 11%.

3.5. Vegetation Composition

Based on observations at several points in the Ternate island area which is considered representative of the Tongole Village area, Central Ternate district, because there are springs that enter the protected area of the Ternate-Tidore KPHL. The number

of vegetation found was 38 types of vegetation at all growth levels, namely 8 types of seedling level, 10 types of sapling level, 13 types of poles and 7 types of tree level.

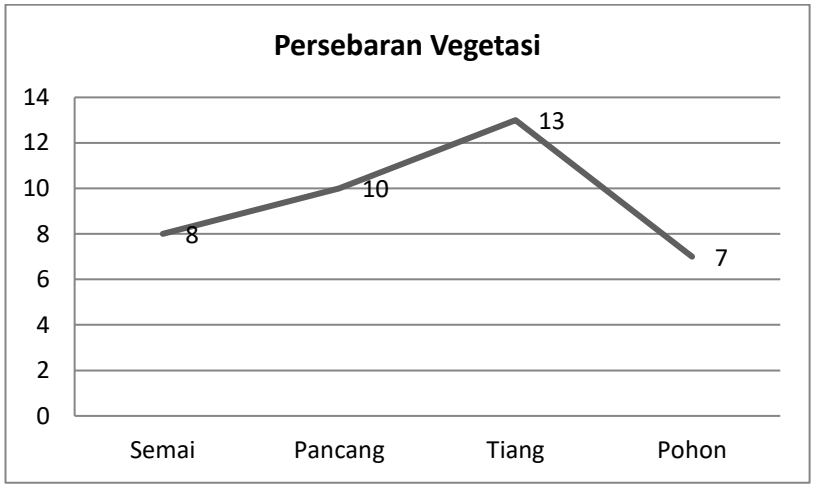


Figure 1. Vegetation by Growth Rate

3.5.1. Seedling Stand Composition Analysis

Seedling is the lowest growth rate in plants. Wood species have a low distribution, white teak and kluwih types, due to disturbances to the ecology, namely the conversion of land functions to meet community needs. The distribution of vegetation at the seedling level is presented in Table 1.

Table 1. Distribution of Semail Level Vegetation

No	Stand Type	Latin name	NumberSpecies	KR %	FR %	INP %
1	Vines	*Lygodium*	43	20,10	14.29	34.39
2	Paitan	*Tithonia Diversifolia*	31	14.50	14.29	28.79
3	Boston Fern	*Nephrolepis Exaltata*	75	35,10	17.86	52.96
4	ferns	*Polypoldium Vilgare*	36	16.80	17.86	34.66
5	pure	*Laportea Stimulants*	11	5.14	10.71	15.85
6	Kluwih	*Artocarpus Altilis*	8	3.74	14.29	18.03
7	Forest Taro	*Colocasia Esculenta*	7	3.27	3.57	6.84
8	White Teak	*Gmelina Arborea*	3	1.40	7.14	8.54
Total			214	100	100	

Source: Primary Data Analysis 2019

3.5.2. Stake Stand Composition Analysis

Analysisshow forest banana dominates for the stake level with the INP value (50.15%). Other species that also tend to be quite dominant are stone bamboowith the INP value (47.31%). Forest bananas and bamboo are very dominant due to the conditions in which they grow in accordance with the availability of sufficient water in the soil. In addition, local people also often use bamboo and bananas for their needs so that banana and bamboo plants are always allowed to thrive in this area.Local people usually haveuse bananas and bamboo as food, animal feed, medicinal ingredients, fiber sources, cover for seedlings or plant seeds and food wrappers. The philosophy of the banana tree, which always regenerates through its shoots before it bears fruit and dies so that it is still able to survive to provide benefits to the community, makes the banana tree often used as a

symbol in traditional ceremonies.The distribution of vegetation at the seedling level is presented in Table 2.

Table 2. Distribution of Vegetation at Seed Level

No	Stand Type	Latin name	Amount species	KR %	FR %	DR %	INP %
1	Melinjo	*Genetum Genemon*	4	6.25	11.76	11.57	29.58
2	Forest banana	*Moses balbisiana*	13	20.3	11.76	18.08	50,15
3	Durian	*Durio zibetenus*	2	3.13	5.88	13.89	22.90
4	Nutmeg	*Myristica faragran Hutt*	1	1.56	2.94	7.53	12.03
5	pure	*Laportea stimulant syn*	11	17.2	11.76	5.21	34.16
6	Kluwih	*Artocarpus altilis*	4	6.25	8.82	14.45	29.52
7	stone bamboo	*Dendrocalamus stricture*	17	26.6	14.71	6.04	47.31
8	Forest Eggplant	*Solanum torvum*	2	3.13	5.88	1.88	10.89
9	Enau	*Arenga pinata*	4	6.25	11.76	14.94	32.95
10	Mahang/mara	*Macaranga tanarius*	6	9.38	14.71	6.40	30.49
Total			64	100	100	100	300

Source: Primary Data Analysis 2019

3.5.3. Pile Stand Composition Analysis

The pole-level species with the highest INP was 32.50% (Table 3). The INP value of the species received the largest contribution from the dominance value and its relatively higher density compared to other species. Based on the INP value, it is known that kluwih or often referred to by local people as gomo is the dominant species in the toggole area ecosystem. Other pole species that are also quite dominant areWhite Teakand Palm with an INP value of 30,80 % and 30.40 %. In contrast to ironwood which has the lowest Important Value Index (INP), namely14.90%. It can be assumed that the ability of ironwood to reproduce and associate with the environment is strongly influenced by human intervention and has not been able to carry out natural succession. Here is presented Table 3. Vegetation Analysis at Pole level.

Table 3. Vegetation Analysis at Pole level.

No	Stand Type	Latin name	Amount	KR %	FR %	DR %	INP %
1	White Teak	*Gmelina arborea*	7	10.3	12.1	8.42	30,80
2	island	*Alstonia scholaris*	5	7.35	9.09	7.74	24,20
3	Nutmeg	*Myristica fragran hutt*	4	5.88	6.06	7.16	19.10
4	Melinjo	*Genetum ganemon*	6	8.82	6.06	5.62	20,50
5	Palm	*Arecaceae*	9	13.2	12.1	4.99	30,40
6	Durian	*Durio Zibetinus*	6	8.82	6.06	9.87	24.80
7	Lansa	*Lansium domesticum*	5	7.35	3.03	5.91	16.30
8	Cingkeh	*sizygium aromaticum*	3	4.41	12.1	6.98	23.50
9	Mahang/Mara	*Macaranga tanarius*	5	7.35	6.06	7.54	21.00
10	Angsana	*Ptrocarpus indicus*	6	8.82	3.03	9.84	21.70
11	Ulin	*Eusideroxilon zwageri*	3	4.41	3.03	7.49	14.90
12	Cepaka Manado	*Magnolia Campaca*	3	4.41	6.06	9.92	20,40
13	Kluwih	*Artocarpus altilis*	6	8.82	15.2	8.52	32.50
Total			68	100	100	100	300

Source: Primary Data Analysis 2019

3.5.4. Analysis of Tree Stand Composition

The plant species at the tree level are dominated by Angsana with an INP value of 58.99%, the second for Durian plants is 50.81% (Table 4). Angsana and durian vegetation are the result of rejuvenation (conservation) by the forestry service. Angsana and durian plants were chosen as conservation plants because they have high economic value and play an important role in conserving water and soil resources. In addition to these two types, tree stands in the form of kapok, ironwood and cempaka manado are also commonly found in the Tonggole area. Similar to the Angsana, these stands are also stands deliberately planted by the forestry service as a form of conservation of forest resources in the Tonggole area. This stand has deep roots, with a hydraulic conductance mechanism, namely the ability of plants to absorb large amounts of water at night to be distributed to the surface, then in the morning the surface water will be reabsorbed by surface roots and used for metabolism here is presented Table 4. Vegetation Analysis at Tree level.

Table 4. Vegetation Analysis at Tree level.

No	Stand Type	Latin name	Amount	KR	FR	DR	INP
1	Angsana	*Ptrocarpus indicus*	6	22,20	22.22	14.55	58,99
2	Kapok	Ceiba petandra	4	14.80	16.67	14.29	45.77
3	Ulin	*Eusideroxilon zwageri*	5	18,50	11.11	17.31	46.94
4	Cempaka Manado	*Magnolia Campaca*	3	11.10	11.11	14.08	36.30
5	Durian	*Durio Zibetinus*	4	14.80	22.22	13.78	50.81
6	Nutmeg	*Myristica fragran hutt*	3	11.10	11.11	9.36	31.58
7	Cingkeh	*sizygium aromaticum*	2	7.41	5.56	16.64	29.60
Total			27	100	100	100	300

Source: Primary Data Analysis 2019

3.4. Vegetation Diversity Index of Seedlings, Saplings, Poles and Trees

Based on the research results and the range of the species diversity index found at the research location, the vegetation diversity index is seen from the number of individuals. So that the number of seedling-level vegetation types was found to be 214 individuals, while the types of sapling-level vegetation were found to be 64 individuals, for pole-level vegetation types were found to be 68 individuals and tree-level vegetation types were found to be 27 individuals. To see the type of vegetation at the level of seedlings, saplings, poles and trees, it is presented in Table 5.

Table 5. Data analysis of the level of diversity of seedlings, saplings, poles and trees

tiers	Total	H'
Seedling	214	1.72
Stake	64	2.00
Pole	68	2.51
Tree	27	1.89

Source: Primary Data Analysis 2019

Based on the data in Table 5 regarding the Diversity Index, it can be seen the species diversity index.Magurran, (1988),The range of values for the calculation of the diversity index (H) is as follows if the criteria:

1. **H=3 : High species diversity**
2. **1<H<3 : Medium species diversity**
3. **H=1 : Low species diversity**

Based on the results of the study and the range of the seedling diversity index, that is (1<H<3) which is the medium category with a value of (1,72). Furthermore, the diversity index of sapling vegetation species whose diversity is in the medium category is (H<3), with a value of (2.00). While the diversity index of pole vegetation types is also in the medium category with a value of (2.51), while tree-level vegetation types with a diversity index range are also in the medium category with a value of (1.89). Vegetation based on 4 levels of growth is included in the diversity index category with a range of 1<H<3 in the medium category. The range of the diversity index has its own benchmark. In this study, the results of the calculation of the diversity index (H') fall into the medium category which means moderate diversity,

V. CONCLUSION

Based on the results and discussions that have been made, the following conclusions can be drawn:

1. Communities around the Ternate-Tidore KPHL area have a tendency to choose a planting model with an agoforestry pattern, namely utilizing yards with the highest percentage of 17% which can have a good impact on the environment, economy, and social community to improve community welfare.
2. There is a type of vegetation that has an Important Value Index with the highest percentage in various classes of stands, including the Angsana species with (INP) 58,99% for tree class, kluwih type with INP (32.50%),on pile class, type *Moses balbisiana*(Forest Banana)with an INP value of (50.15%)in the sapling class and in the seedling class there is a type of buston fern with an INP Importance Value Index of (52.90%).
3. The level of diversity of vegetation types found in the springs area of Ternate Island was found at the type of vegetation at the seedling level with a range of 1<H<3 which is the medium category with a value of (1.72), the diversity index of sapling vegetation species whose diversity is in the medium category is H<3 with a value of (2.00), then the type of pole vegetation is also in the medium category with a value of (2.51) and tree-level vegetation types with a diversity index range are also in the medium category with a value of (1.89).

BIBLIOGRAPHY

[1] R. Of *et al.*, "REFLECTIONS OF LAW OF FORESTRY TOWARDS THE EXISTENCE OF VILLAGE," vol. 11, no. 4, pp. 46–50, 2016.

[2] L. R. Iverson and M. K. W. Ali, "GRASSLAND REHABILITATION AFTER COAL AND," vol. 2, pp. 85–129, 1992.

[3] D. S. Gandhi and S. Sundarapandian, "Inventory of trees in tropical dry deciduous forests of Tiruvannamalai district , Tamil Nadu , India," vol. 15, no. 2, pp. 169–179, 2014, doi: 10.13057/biodiv/d150208.

[4] E. Weiher, P. A. Keddy, and C. Kin, "FORUM FORUM FORUM new questions from Assembly rules , null models , and trait dispersion : old patterns," vol. 74, no. 1, pp. 159–164, 2012.

[5] D. Sapa, K. Minahasa, F. In, S. Village, and S. M. District, "(COMPOSITION AND STRUCTURE VEGETATION OF MANGROVE," 2016.

[6] A. Reis, F. C. Bechara, and D. R. Tres, "Nucleation in tropical ecological restoration," no. April, pp. 244–250, 2010.

[7] J. Grogan and P. Barreto, "Big-Leaf Mahogany on CITES Appendix II : Big Challenge , Big Opportunity," vol. 19, no. 3, pp. 973–976, 2005.

[8] M. F. Fachrul and U. Trisakti, "LAND USE AND WATER QUALITY

RELATIONSHIPS IN THE CILIWUNG RIVER BASIN , INDONESIA," no. June, 2017.
[9] S. Fraser, M. Koenig, L. Farach, P. Mancias, and K. Mowrey, "A De Novo case of autosomal dominant mitochondrial membrane protein-associated neurodegeneration," *Mol. Genet. Genomic Med.*, no. April, pp. 1–5, 2021, doi: 10.1002/mgg3.1706.
[10] S. D. Gosling, C. J. Sandy, and J. Potter, "' Cat People ' ' Dog People ' and ' Cat People ,'" *A Multidiscip. J. Interact. people Anim.*, vol. 23, no. 3, pp. 213–222, 2010.
[11] C. Kusmana and A. Hikmat, "The Biodiversity of Flora in Indonesia," *J. Nat. Resour. Environ. Manag.*, vol. 5, no. 2, pp. 187–198, 2015, doi: 10.19081/jpsl.5.2.187.
[12] P. Komaratulloh *et al.*, "PEMANFAATAN SUMBERDAYA ALAM (Studi Kasus di Kasepuhan Karang Desa Jagaraksa Kecamatan Muncang Kabupaten Lebak Provinsi Banten)," *J. Nusa Sylva*, vol. 19, no. 1, pp. 30–34, 2019.
[13] S. E. H. T. L. N. Elferida Sormin, Bernadetha Nadeak, "The Integration of Lecturers' Professionalism and Intelligence with Environment Insight," *Psychol. Educ. J.*, vol. 58, no. 2, pp. 5981–5987, 2021, doi: 10.17762/pae.v58i2.3075.
[14] A. Wachjar, "PERTUMBUHAN DAN HASIL BENIH KENAF (Hibifcus cannabin us L .) PADA TANAH LATOSOLI) (EFFECT OF PHOSPHOROUS AND POTASSIUM FERTILIZERS APPLICATION ON THE GROWTH AND SEED YIELD OF KENAF (Hibiscus cannabinu .\' L .) ON LA TOSOL) The experiment was aimed to," vol. 22, no. 1, 1994.
[15] Z. Misbah, J. Gulikers, R. Maulana, and M. Mulder, "Teacher interpersonal behaviour and student motivation in competence-based vocational education: Evidence from Indonesia," *Teach. Teach. Educ.*, vol. 50, pp. 79–89, 2015, doi: 10.1016/j.tate.2015.04.007.
[16] Rawung, J. B. M., Sahara, D., Indrasti, R., Fadwiwati, A. Y., & Yapanto, L. M. (2021). *INCREASING FRUIT YIELDS AND INCOME OF RED CHILI FARMING BY USING CHEMICAL AND BIOLOGICAL FERTILIZERS IN RAINFED RICE*. *20*(2), 1–10.
[17] Sahara, D., Hartoyo, B., Fadwiwati, A. Y., Yapanto, L. M., Science, M., & Indrasti, R. (2021). *THE IMPROVEMENT PRODUCTION AND EFFICIENCY OF UPLAND RICE IN BOYOLALI DISTRICT CENTRAL JAVA , INDONESIA*. *20*(2).
[18] Muhaimin, A. W., Toiba, H., Retnoningsih, D., & Yapanto, L. M. (2020). *The Impact of Technology Adoption on Income and Food Security Of Smallholder Cassava Farmers : Empirical Evidence From Indonesia*. *29*(9), 699–706.