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Analysis on Vegetation for Landscape Arrangement of Agrotourism in Cikapek, Leuwidamar, Lebak District

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ABSTRACT

Vegetation analysis is important for regulating the balance of carbon dioxide and oxygen in the air, improving the physical, chemical, and biological properties of the soil, and managing groundwater. The aim is to determine the composition and structure of the plants present and located in the Cikapek Agrotourism area, Lebakparahiang Village, Leuwidamar District, Lebak Regency. The method used is sample plots measuring 100 m x 100 m (1 Ha) with 3 (three) observation plots, along the trail line there are plots at equal intervals. The plot sizes are (a) 5 m × 5 m for the sapling phase, (b) 20 m × 20 m for the tree phase. The observed tree growth phases: a. Mature trees with a diameter ≥ 20 CM b. Saplings, young trees with a height ≥ 1.5 M. Results indicate the plant species Cocos nucifera or coconut tree has the highest IVI (Important Value Index) of 0.92651% and the lowest Importance Value Index is the sugar palm plant with an IVI of 0.583%, and the lowest Important Value Index is the Waru plant with an IVI of 0.112%. However, the research should address broader regional planning concerns, integrating other biophysical factors to ensure a comprehensive and harmonious development strategy. This will help create an agrotourism area that supports ecological balance, aligns with the needs of the local community, and promotes long-term environmental sustainability.

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1. INTRODUCTION

Indonesia's high biodiversity, known to be the second largest in the world that urge to be managed and utilized based on the principle of sustainability for its continuity. Its' natural biological resources and their ecosystems in the form of diverse flora, fauna and natural phenomena as well as the beauty of natural scenery might be developed and utilized as much as possible for the welfare of the people while still paying attention to efforts to conserve natural resources that can be utilized as nature conservation and at the same time as natural tourism objects (Alikodra, 2010).

The Vegetation analysis becomes significant because it can discover the presence of vegetation from each growth level. The presence of trees in general will have a positive impact on the balance of the ecosystem on a wider scale. In general, the role of vegetation in an ecosystem is related to the regulation of the balance of carbon dioxide and oxygen in the air, improving the physical, chemical and biological properties of the soil, regulating groundwater management, and others.

Agrotourism areas have three main functions, firstly is for public space facilities area, secondly, part for agriculture such as seedling or transplant, and third is for providers environmental service place. That is why vegetation analysis is needed because of its complexity conditions as a reference for the development and arrangement of plants 0n the area.

The aim of the research is to understand the composition types and structural forms of plants that suitable for the area designated as an agro-tourism zone in Cikapek, Leuwidamar District. This research is urge to acquired scientific information in term of vegetation on Agrowisata area that useful for basic planning and development area.

2. METHOD

Vegetation analysis was carried out in the area of the Cikapek Agrotourism Area Plan, Lebakparahiang Village, Leuwidamar District, Lebak Regency, for 1 month (February, 2024).

Figure 1. Sample zone analysis vegetation on Agrowisata Cikapek area
(Source: process by author from Google Maps)

Analyzing the Cikapek Agrotourism area requires essential tools for accurate data collection and planning. Writing tools document observations and measurements, while measuring tape, rulers, and meter tape ensure precise spatial assessments. Raffia strings mark boundaries, and a compass determines directions for mapping and planting alignment. A camera provides visual documentation, and a map of the area offers a comprehensive layout for informed decision-making and sustainable development.

The primary data collection is carried out in the research area using a sample plot method with a size of 100 m x 100 m (covering 1 Ha) as many as 3 (three) plots/observation plots. In one sample plot, the plot is divided into sub-plots to facilitate observations in the field, with a size of 20 m x 20 m. The number of observation subplots in the field is further divided within the observation radius based on the observed tree growth phase. The method used in this research is the grid line method, along the trail line there are plots at the same distance. The plot size is (a) 5 m × 5 m for the sapling phase, (b) 20 m × 20 m for the tree phase. (Adjusted for variables observation).

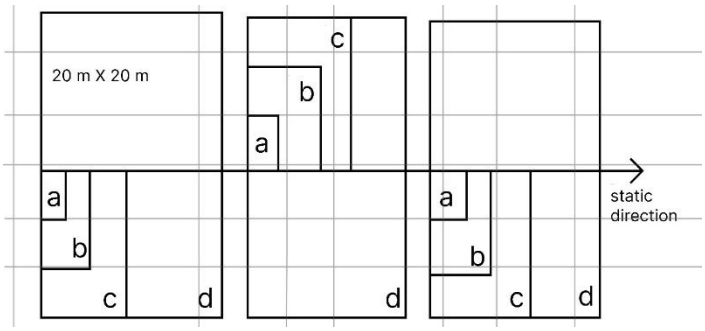

Figure 2. Sample Plot Design in the field (Source: Author)

The variables for the primary data collected in the field are the diameter of the tree trunk at a height of 150 cm from the ground surface, the name of the plant species, and the number of individuals per species. The growth phases of trees in this study are as follows:

1. Sapling with a height of ≥ 1.5 meters.
2. Adult tree with a diameter of ≥ 20 cm.

Data Analysis The collected data is analyzed to determine the species composition and vegetation structure. To obtain important values, density, dominance, and frequency are calculated based on the following equations:

$$Density\ (\mathrm{K}) = \frac{Number\ Of\ Individuals}{Plot\ Area}$$

$$Relative\ Density\ (\%) = \frac{Density\ Of\ a\ Species/kinds}{Density\ Of\ All\ Spesies/kinds}\ x\ 100\%$$

$$Frequency\ (F) = \frac{Number\ Of\ Plots\ Found\ Of\ a\ Kind/Species}{Total\ Number\ Of\ Plots}$$

$$Relative\ Frequency\ (FR) = \frac{Frequency\ Of\ a\ Kind/Species}{Frequency\ Of\ All\ Kinds/Species}\ x\ 100\%$$

$$Domination\ (D) = \frac{Base\ Area}{Plot\ Area}$$

$$Relative\ Domination\ (\%) = \frac{Domination\ Of\ a\ Kind/Species}{Domination\ Of\ All\ Kinds/Species}\ x\ 100\%$$

$$\text{Importance Value Index (INP)} = \mathrm{KR} + \mathrm{FR} + \mathrm{DR}$$

Figure 3. Important Value Equation (Source: Author)

3. RESULTS AND DISCUSSION

3.1. General description

The Cikapek Agritourism Area Plan is located in Lebakparahiyang Village, Leuwidamar District, Lebak Regency, which has a diversity of vegetation and natural resource potential that still has the character of local potential. The potential diversity of local vegetation is illustrated by the diversity of plants in the area which is still dominated by local species.The Cikapek Agrotourism area is located between the coordinates, 6°29'36.09"S - 106° 9'57.32"E and has an area of 50 hectares with a height of 200 meters above sea level. Currently in the planning stage as an agrotourism area from the Regional Government of Lebak Regency, Banten Province. The Cikapek Agrotourism area has a generally tropical climate with an average temperature of 240C – 270C. The climate conditions of the area include climate type C according to Schmidt and Ferguson's classification. The average rainfall is 2218.0 mm/year with the driest climate around December and the wettest in January.

3.2. Results of Vegetation Analysis in the Cikapek Agrotourism Area

The research results showed that there were 15 plant types and 11 families in the sample plot locations in the field. The existence of plant species allows them to increase outside the sample plot area in the field. Vegetation diversity has a relatively decreasing and increasing trend in plant types in the Cikapek agrotourism area, this is due to land use in the form of ex-HGU cultivated land by farmers on a temporary land use scale. Apart from that, there is disturbance to existing vegetation, especially forest encroachment to be used as agricultural land by local communities.

The results of the vegetation analysis show that plants with the highest Importance Value Index are not the primary community builders in the Cikapek Agrotourism Area. The composition of plant communities continues to change periodically according to the level of land use by the surrounding community. In the area, the Importance Value Index of plant species in a community is one of the parameters that indicate the important role of these plant species within their community

The results of the vegetation analysis show that the plant species Cocos nucifera has the highest IVI in the tree phase and the plant species Vernonia amygdalina in the pole phase. This indicates that the vegetation condition at the planned development site of Cikapek Agrotourism in Leuwidamar District is a secondary forest that has grown after disturbances, allowing pioneer species to thrive. This relates with the status of the former HGU land utilized by the community as mixed garden land, resulting in new plant species and predominantly young plants.

3.3. Composition of Plant Species in the Cikapek Agrotourism Area

The research results obtained at the sample map location for the Cikapek agrotourism area show that there are 15 plant species and 11 families from the tree community at the tree and sapling phases. Each has the following distribution: 4 plant species in the tree phase, 11 plant species in the sapling phase.

Table 1. Plant Species and Families at the Vegetation Research Location Tree Phase Vegetation

No	*Scientific Name*	*Local Name*	*Family*
1	*Arenga pinnata*	*Aren*	*Arecaceae*
2	*Cocos nucifera*	*Kelapa*	*Arecaceae*
3	*Vernonia amygdalina*	*Afrika*	*Asteraceae*
4	*Albizia falcataria*	*Albasia*	*Fabaceae*
5	*Durio zibethinus*	*Durian*	*Malvaceae*
6	Artocarpus heterophyllus *dan cempedak* Artocarpus integer	*Nangka /Campedak*	Moraceae
7	*Hibiscus tiliaceus*	*Waru*	*Malvaceae*
8	*Acacia dealbata*	*Akasia*	*Fabaceae*
9	*Bambusa vulgaris Schrad*	*Bambu*	*Poaceae*
10	*Hevea brasiliensis*	*Karet*	*Euphorbiaceae*
11	*Sandoricum Koetjape*	*Kacapi*	*Meliaceae*
12	*Alstonia scholaris*	*Lame/Pulai*	*Apocynaceae*
13	*Lagerstroemia*	*Bungur*	*Lythraceae*
14	*Garcinia sp*	*Manggis*	*Clusiaceae*
15	*Swietenia mahagoni*	*Mahoni*	*Meliaceae*

Source: Author (2024)

3.4. Tree Phase Vegetation

Based on the Important Value Index calculation results for the tree level, the plant species with the highest Important Value Index at the tree phase is the Coconut plant species with an IVI of 0.92651%, followed by the Sentul plant species with an IVI of 0.81969% and the Mahogany plant species with an IVI of 0.67121%. The plant species with the lowest Important Value Index is the Palm plant with an IVI of 0.58257% followed by Mahogany plant with an IVI of 0.671%

Table 2.Important Value Index at the Tree Phase

No	*Scientific Name*	*Local Name*	*K*	*KR (%)*	*FR (%)*	*DR (%)*	*IVI (%)*
1	*Arenga pinnata*	*Aren*	0.0025	0.125	0.16666	0.29090	0.58257
2	*Cocos nucifera*	*Kelapa*	0.0075	0.375	0.33333	0.21818	0.92651
3	*Sandoricum Koetjape*	*Kacapi*	0.005	0.25	0.33333	0.23636	0.81969
4	*Swietenia mahagoni*	*Mahoni*	0.005	0.25	0.16666	0.25454	0.67121
	Total Amount		**0.02**	*1*	*1*	*1*	*3*

Source: Author (2024)

From Table 2, it describe that the species Cocos nucifera has a high IVI value (0.813345), with 3 plants spread across 2 plots out of the 3 observation plots. The diameter range for Cocos nucifera is between 100 cm to 150 cm. This indicates that the condition of the land utilization in the form of mixed garden and shrubs at this research location has been damaged due to community activities in utilizing the land, as indicated by the small number of trees and small tree diameters.

3.5. Vegetation Phase of Sapling

Based on the calculation results of the Importance Value Index at the sapling level, it was found that the species with the highest Importance Value Index at the sapling phase is the African plant species with an IVI of 402.27738%, followed by the Acacia plant species with an IVI of 0.8202%, and the Albasia plant species with an IVI of 0.27834%. Meanwhile, the species with the lowest Importance Value Index is the Waru plant with an IVI of 0.11217% next lowest is the 2nd lowest Mangosteen plant with an IVI of 0.122%; the 3rd lowest is the Lame/ Pulai plant with an IVI of 0.128%; 4th lowest Durian plant with IVI 0.131%; The 5th lowest is the Bungur plant with an IVI of 0.152%

Table 3. Importance Value Index in the Sapling Phase

No	*Scientific Name*	*Local Name*	*K*	*KR (%)*	*FR (%)*	*DR (%)*	*IVI (%)*
1	*Vernonia amygdalina*	*Afrika*	2.48	402	0.10714	0.17024	402.27738
2	*Albizia falcataria*	*Albasia*	0.44	0.07096	0.10714	0.10023	0.27834
3	*Durio zibethinus*	*Durian*	0.16	0.02580	0.07142	0.03341	0.13064
4	Artocarpus heterophyllus *dan cempedak* Artocarpus integer	*Nangka /Campedak*	0.24	0.03870	0.10714	0.05887	0.20472
5	*Hibiscus tiliaceus*	*Waru*	0.08	0.01290	0.07142	0.02784	0.11217
6	*Acacia dealbata*	*Akasia*	1.92	0.30967	0.07142	0.43914	0.82024
7	*Bambusa vulgaris Schrad*	*Bambu*	0.36	0.05806	0.07142	0.02784	0.15733
8	*Hevea brasiliensis*	*Karet*	0.2	0.03225	0.10714	0.04136	0.18076
9	*Alstonia scholaris*	*Lame/Pulai*	0.12	0.01935	0.07142	0.03739	0.12817

10	*Lagerstroemia*	*Bungur*	0.08	0.01290	0.10714	0.03182	0.15186
11	*Garcinia sp*	*Manggis*	0.12	0.01935	0.07142	0.03182	0.12260
	Total Amount		**6.2**	**402.6**	**0.96428**	*1*	**404.56428**

Source: Author (2024)

From Table 3, it shown that Vernonia amygdalina has a high IVI (402.27738), with a total of 62 plants distributed in 3 plots from 3 observation plots. The diameter range for Vernonia amygdalina is between 30 cm to 70 cm. This shows that the condition of land use in the form of mixed gardens and shrubs in this research location is damaged due to community activities in land use, marked by the small number of trees and the small diameter of the trees.

4. CONCLUSION

Based on the results of this research, 15 types of plants and 11 families were obtained tree communities in the tree and sapling phases. Importance Value Index at the tree level: It was found that the plant species that had the highest Importance Value Index at the tree phase was the Coconut plant species with an IVI of 0.92651% and the lowest Importance Value Index is the sugar palm plant with an IVI of 0.583%. The highest Important Value Index in the sapling phase is the African plant species with an IVI of 402.27738% and the lowest Important Value Index of 1 is the Waru plant with an IVI of 0.112%; next lowest is the 2nd lowest Mangosteen plant with an IVI of 0.122%; the 3rd lowest is the Lame/ Pulai plant with an IVI of 0.128%; 4th lowest Durian plant with IVI 0.131%; The 5th lowest is the Bungur plant with an IVI of 0.152%.

To ensure the types of plants in the Cikapek Agrotourism area remain balanced and sustainable, it is essential to implement thoughtful and well-informed policies in its development. Special attention should be given to plant species with the lowest Importance Value Index (IVI) that continue to thrive, ensuring their preservation as a hallmark of the Cikapek area. This approach will not only maintain biodiversity but also highlight the unique characteristics of the region.

Further research is required at the proposed site of the Cikapek Agrotourism area, located in Leuwidamar District. Such studies should focus on the effective management of the agrotourism area, including the identification of specific plant species suitable for sustainable cultivation. Additionally, research should address broader regional planning concerns, integrating other biophysical factors to ensure a comprehensive and harmonious development strategy. This will help create an agrotourism area that supports ecological balance, aligns with the needs of the local community, and promotes long-term environmental sustainability.

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