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Research paper

Vegetation's Structure and Compotition to Support the Javan Gibbon (Hylobates Moloch) Habitat Sustainability in Gunung Halimun National Park

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Abstract

There are a few disturbances which could affect landscape's structure and function, for instance increased population and development growth. These are also consequences of development of facilities to support human activity. Mount Halimun National Park territory supports the biggest population of Javan Gibbon (Hylobates moloch) in Java. There are few factors which affect forests destruction in Gunung Halimun namely transporation facilities, tea plantation enclave, and gold mining. The present study is a part of the landscape analysis for conservation and management of Javan Gibbon in Mount Halimun National Park. The study was conducted at Mount Kendeng which is the Javan Gibbon habitat, at the Mount Halimun, West Java. Elevation of the park area ranging from 570 – 1929 m asl. The wide range of altitudes caused diverse ranges of habitat types also floristic composition. This researxh aims to analyze vegetation's structure and composition of Javan Gibbon habitat. To spupport Javan Givon habitat sustainably, plant selection is a very important step in the landscape design sequence. We recorded 64 species of trees with DBH > 10 cm in 25 families, with density of 401 trees/hectare and total basal areas of 35,30 m2. Species richness is low which is typical of mountain forests on West Java.

Keywords: *Composition, structure vegetation, primate habitat, national park*

1. Introduction

Mount Halimun National Park (MHNP) territory support biggest population of Javan Gibbon (Hylobates moloch) in Java (Asquith et al, 1995). This territory also represent habitat which for many endangered species like Javan Eagle (Spizaetus bartelsi), Leopard (Panthera pardus), and Grizzled Monkey Leaf (Presbytis comata) (Yoneda et al, 2001). In MHNP, Javan Gibbon usually found especially in primary forest habitat, around 30 groups with each group consist of 2 until 4 individual (Sugardjito & Sinaga, 1997). To observe Javan Gibbon, conservation ecological studies needs to be done in MHNP as Javan Gibbon habitat which still remained in the world.

Increasing population and development growth at the conservation territory, affect on the disturbance for structure and function of landscape. Other factor which effecting the ecological function in MHNP landscape are: farming encroachment, tea farming enclave in the middle of MHNP territory, and gold mine in the west part of territory (Asquith et al, 1995).

Other threat which annoying the ecological in MHNP landscape is this park has loss 2% of its forest in last 10 years (Yoneda et al, 2001). The existence of threat causing an annihilation of vegetation at some zonation, destruction of certain vegetation can result the loss of chosen food for primate, because certain type of trees is very meaningful. Destruction of forest substratum will pursue the regeneration, and in the end will causing the degradation of primate population (Marsh et al, 1987).

On Java, Steenis (1972) synthesized available qualitative information on vegetation and ecology, and identified the montane zone (100 - 2,400 m asl) and subalpine zones (>2,400 m asl). Based on some explorations in mount Halimun,(Wiriadinata ,2002) recorded 845 plant species in 436 genera and 125 families, slightly lower than the flora of the mount Gede-Pangrango (Sunarno & Rugayah 1992).

2. Method

The location study lies between the 6º 37' and 6º 53' S latitudes, and 106º 16' and 106º 38' E longitudes. The area was originally designated as a protection forest in 1924, and in 1979 it was expanded and was proclaimed as a nature reserve (Yoneda et al, 2001). The area was then declared a national park in 1992, covering a total area of 40,000 Hectares. Elevation of the park area ranges from 570 m to 1,929 m asl.

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A plot of one hectare (20 x 500 m) was established in area identified as the most suitable habitat for Javan Gibbon at the mount Kendeng area within the MHNP. The plot was constructed by initially establishing a 20 x 20 m subplot, which was subsequently expanded by incrementally adding a series of subplots up to a total area of one-hectare, thus the plot forms a transect consisting of 25 subplots. It lies on a hilly topography with the elevation range of 1,100 m to 1,200 m asl.

All trees with DBH ≥10 cm were enumerated and identified, their diameters were measured, and their heights were estimated. (Mueller-Dombois and Ellenberg ,1974). The voucher specimens were collected for identification at the Herbarium Bogoriense at Bogor. The nomenclature follows Backer & Bakhuizen van den Brink, Jr. (1958-1968)

3. Results and Discussion

3.1. Composition

the result shows that 64 species in 25 families represented by 401 individuals . The total basal area are 35.30 m² , and DBH > 10 cm .

Table 1 shows that the mount Kendeng forest was dominated by Fagaceae (70.65%), which was represented by the genera Castanopsis, Lithocarpus, and Quercus. The other prevailing families were Hammamelidaceae, Myrtaceae, Theaceae, and Lauraceae. It should be noted that both in terms of importance values and number of species Fagaceae and Lauraceae are prevalent.

Macaranga javanica and Macaranga triloba were present in diameter classes up to 60 - 70 cm in height classes up to B layer. The high Importance Values of Hammamelidaceae is attributed to the high density and basal area of the single species of Altingia excelsa (Tables 2, & 3).

Table 1: The common families according to the Total Species Importance Values for Families (TSIVF)

No	Family	TSIVF
1	*Fagaceae*	70.65
2	*Hammamelidaceae*	50.01
3	*Myrtaceae*	31.09
4	*Theaceae*	22.29
5	*Lauraceae*	20.14
6	*Euphorbiaceae*	17.65
7	*Icacinaceae*	15.79
8	*Rutaceae*	11.59
9	*Rosaceae*	10.87
10	*Clusiaceae*	9.05
	T O T A L	259.13
		(86.37%)

Table 2: The most common tree species based on Importance Values (IV)

No	Species	IV
1	*Altingia excelsa*	50.01
2	*Castanopsis javanica*	22.53
3	*Castanopsis acuminatissima*	22.44
4	*Schima wallichii*	19.53
5	*Syzgium* sp	17.90
6	*Euodia latifolia*	11.59
7	*Syzygium laxiflorum*	11.08
8	*Prunus arborea*	10.87
9	*Platea excelsa*	9.50
10	*Garcinia rostrata*	9.05
T O T A L		184.50
		(61.50%)

Table 3: The most common tree species according to the Density (D) .

No	Species	Density (tree/ha)
1	*Altingia excelsa*	34
2	*Castanopsis acuminatissima*	32
3	*Syzqium* sp	29
4	*Schima wallichii*	25
5	*Euodia latifolia*	24
6	*Castanopsis javanica*	22
7	*Prunus arborea*	20
8	*Garcinia rostrata*	16
9	*Syzqium laxiflorum*	15
10	*Platea exelsa*	11
	T O T A L	228
		(56.15%)

The situation above is comparable to those at other sites on the mount Halimun (Simbolon & Mirmanto 1997; Mirmanto & Simbolon 1998; Yoneda et al. 2001) and the mount Gede-Pangrango (Meijer 1959; Yamada 1975, 1976a & b, 1977, 1990; Abdulhadi et al. 1998). The similarity of floristic composition between the present plot and another one-hectare plot at comparable elevation at Cisarua in the MHNP (Simbolon & Mirmanto 1997) is small, with a Jaccard's similarity index of 13.6%.

The two most common and leading species in both mount Halimun and mount Gede-Pangrango are Altingia excelsa and Schima wallichii. Castanopsis and Lithocarpus are present in all but species that become locally prevalent in each site at both mount Halimun and mount Gede-Pangrango may vary.

Figure 1 shows the curve of cumulative increment of number of species in accordance with the increase of area. It is evident that the number of species within this hectare-plot increases rapidly and beginning to flatten out at around one hectare.

In the latter two curves, each reaches the point of inflection at one hectare, where the minimum area can be attained at this point, indicating the beginning of the decrease of species richness, which reflects also the decrease of species diversity.

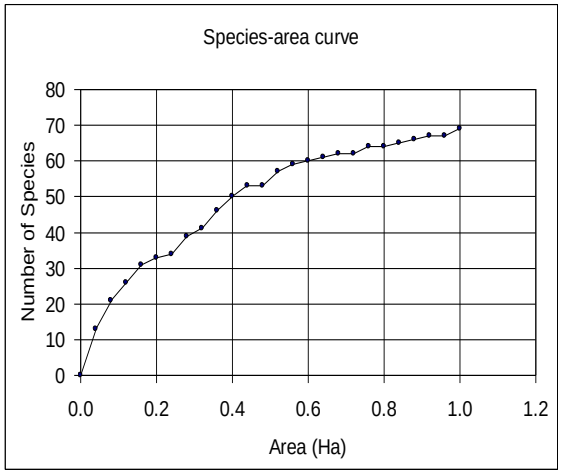

Figure 1: A species-area curve for trees according to number of species and area, with DBH ≥10 cm .

Figure 3 shows the basal areas belong to family Hammamelidaceae, Theaceae, Fagaceae, and Icacinaceae. Altingia excelsa with the basal area of 12 m². Figure 2 and Figure 3, which show that 75.61% of the trees were less than 30 cm DBH. Only 24.39% occurred with diameters greater than 30 cm. Altingia excelsa, Castanopsis javanica and Schima wallichii were prominent in almost all diameter classes and at diameter of 100 - 140 cm all trees were Altingia excelsa. Other large trees with diameter of 50 – 100 cm were Castanopsis acuminatissima, Castanopsis tungurrut, Lithocarpus sp, Platea excelsa, and Syzygium sp.

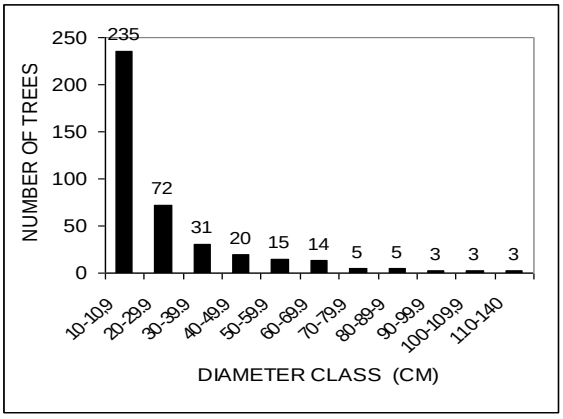

Figure 2: Diameter class distribution of trees with DBH ≥10 cm .

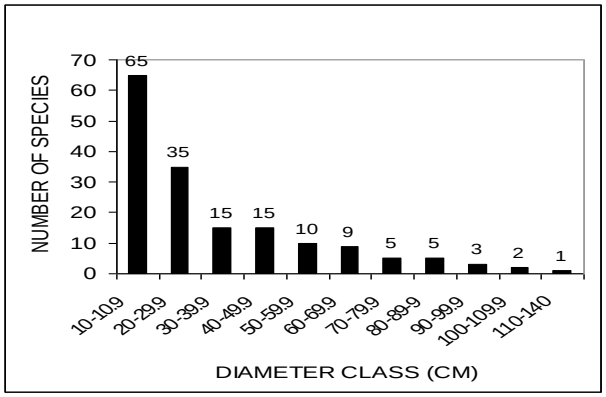

Figure 3: Number of tree species with DBH ≥10 cm according to the diameter classes.

Figure 4 shows the profile diagram on tree height, and tree numbers reflecting the sequence of field records.

(A) The emergent, representing the uppermost layer (30-55 m), contains 11 species, but 40 % of the trees were Altingia excelsa; (B) Upper canopy (20-29.9 m) contains 26 species and the prevalent trees were shared by Altingia excelsa (14.7%), Castanopsis acuminatissima (13.2%), Castanopsis javanica (10.3 %) and Schima wallichii (13.2%); (C) Main canopy (10-19.9 m) is shared by 57 species and four species mentioned in B were still prevalent but at lower proportion; and (D) Lower canopy (5-9.9 m) comprises 38 species and none of them becomes prevalent.

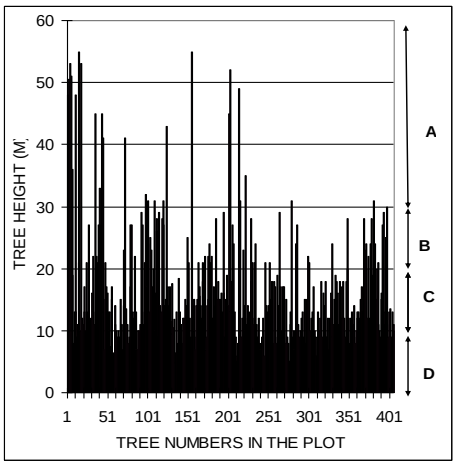

Fig 4: A simulated profile diagram of a one- hectare plot of a montane forest at the Mount Halimun National Park, West Java, showing five strata: A = >30 m; B = 20-29.9 m; C =10-19.9 m, and D = 5-9.9 m.

4. Conclusion

The forest investigated has a low diversity as indicated by low species richness, which is rather characteristic for the montane forest of West Java. Low similarity indices with other various plots in the park indicate that floristically it also cannot be regarded as a typical montane forest of the Mount Halimun National Park. Although there have been a number of vegetation studies in the park, further studies are still needed, in particular at the elevation below 1,000 m and secondary forests in order to understand the vegetation of the park better and to provide more complete data for managing the park.

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