DISTRIBUTION PATTERNS AND HABITAT OF MAMMALS IN MANDALAWANGI RESORT OF MOUNT GEDE PANGRANGO NATIONAL PARK

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ABSTRACT

Distribution pattern and habitat quality of mammals is essential to keep the existing of mammals which depends on interactions between its intrinsic evolutionary and ecological system. Mandalawangi Resort aside from being a conservation area, it is also a tourist area. Tourism activities carried out in the region, will directly and indirectly affect the sustainability of mammal diversity. The benefits of mammals are to stabilize the food chain, the spread of plant seeds, as an object of research and education. The study aims to determine the distribution patterns and habitat of mammals in Mandalawangi Resort . Research on mammal diversity was carried out using 4 methods: rapid assessment, line transect, animal footprint. Habitat data obtained using vegetation analysis and field observation methods. The diversity of mammals in the Mandawalangi Resort consists of 7 types of mammals from 6 families, namely kekes squirrel (Tupaia javanica), langur (Trachypithecus auratus), wild cats (Felis domesticus), wild boar (Sus scrofa), leopard (Panthera pardus melas) , civet mongoose (Paradoxurus hermaphroditus) and house gutters (Suncus murinus). Species wealth index is low (0.50). The diversity index of mammals is included in the low diversity category (0.25). The highest level of mammal species meeting is kekes squirrel (Tupaia javanica) with a value of 29.4%. Evenness index is included in the unstable community category (0.15). Mammalian habitat is divided into tropical rain forests and open land with dominating trees namely Damar (Agathis damara) and Rasamala (Altingia excelsa).

Keyword: distribution, mammal, Mandalawangi Resort, Mount Gede Pangrango National Park

I.   INTRODUCTION

Biodiversity has a role as an indicator of an ecological system and a means of knowing species change[2]. Biodiversity also includes species richness and ecosystem complexity so that it can affect the organism's community, development, and ecosystem stability[3]. Biodiversity has an essential role as an index of environmental quality[4]. Previous research study found that the quality of the environment has a postive relationshio with the biodiversity of species.

Biodiversity has values for human life, namely ecological, aesthetic, religious, economic, cultural and educational values. Biodiversity in Gunung Gede Pangrango National Park is spreading across several parts of the region, one of which is the Mandalawangi Resort. Mandalawangi Resort, aside from being a conservation area, is also one of the tourist areas which will affect the sustainability of biodiversity. Safeguards need to be made to maintain and preserve the existence of biodiversity. Biodiversity that is important in the Mandalawangi Resort is a diversity of mammals.

The role of mammals in ecosystems is as a counterweight to the food chain and the spread of plant seeds[5].

Distribution pattern and habitat quality of mammals is essential to keep the existing of mammals. The risk of extinction in mammals is depend interactions between its intrinsic evolutionary and ecological system, such as habitat and ecological pattern and a suite of environmental and anthropogenic factors[6],[7]. Distribution and patterns involves the abundance of species within its range. Therefore, monitoring extinction of mammals is essential to exsiting of distribution and abundance. Yet, for many species that may be elusive, cryptic or rare, monitoring changes in distribution and abundance over large spatiotemporal scales remains a serious challenge[8].

This data can be used as a basis for management and as an effort to protect mammalian populations. Another objective of this research is sustainable use and providing knowledge to the public about the types of mammals found in the Mount Gede Pangrango National Park. Therefore the aims of this study is to determine the distribution patterns and habitat of mammals in Mandalawangi Resort.

1.1. Formulation of The Problem

Based on the description in the background the problem is formulated as follows:
1. How is the distribution and pattern of mammals species in Mandalawangi Resort?
2. How is the habitat of mammals species in Mandalawangi Resort?

1.2. Theoretical Background

1.2.1 Distribution and Patterns

Distribution and Patterns of Species in a significant problem in ecology. Four factors have been proposed to explain the diversity of species. There is the resource of distribution, the resource of size, the resource of abundance, and the resource of concentration. The resource distribution depends on widespread species that support high local species richness. The resource size and resource abundance are influenced by the extensive resources that could be considered to offer abundant resources. Larger hosts can define the resource size, and the resource concentration can be defined by hosts supported in high density and species richness[9].

1.2.2 Habitat

Habitat is the result of interaction between several components physical, which consists of water, soil, topography, climate and biological components consisting of humans, animals, and vegetation[10]. According to Napier and Napier (1985)[11] species especially for mammals can be found in 3 types of

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large vegetation communities, i.e. tropical forests, tropical grasslands, and transitional areas between two types of ecosystems and are usually forested savannahs. Tropical forests include primary and secondary forests, swamps, forests mangroves, mountain forests, and seasonal forests.

1.2.3 Mammals

Mammals are vertebrate animals that have the characteristics of hair almost in the whole body and have mammary glands in female mammals. The whole mammal mother feeds her children with milk, a balanced diet that is rich in fat, sugar, protein, minerals, and vitamins. Mammals undergo internal fertilization and embryos develop in the uterus of female mammals. Mammals, in general, have a bigger brain compared to other vertebrate animals with the same body size[12]. Parenting mammals have a long enough duration to extend the time for mammalian children to learn the abilities and skills for survival. Mammals are generally divided into two, namely large mammals and small mammals. Criteria for large mammals and small mammals are determined based on body weight[13].

II.   METHODS

The study was conducted at the Mandalawangi Resort, Gunung Gede Pangrango National Park, Cianjur Regency, West Java Province. The study was conducted in March-April 2019. The tools and materials used were stationery, camera, compass, tally sheet, field guide, meter, trap, mammal, and mammal habitat. The type of data collected is divided into primary data and secondary data. Primary data obtained by direct observation include the type and number of mammals, time, location and activity of mammals, habitat characteristics consisting of water availability, vegetation, fauna, and humans). Secondary data in the form of a map of the region, topography, and area was sourced from a literature study.

Data Collection Methods

1.   Diversity of Mammals

Rapid assessment is conducted by recording every animal that is found. The length of the transect line method is about 100 meters with the width of the track depending on the density of vegetation (Payne et al. 2000). Time of observation is conducted in the morning (06.00-09.00) and afternoon (15.00-18.00). Footprints method is an indirect identification by looking at everything left by the wildlife which is a sign of the presence of the wildlife. Found traces can be footprints, food marks, scratch marks, wallowing, hair, and nests.

2.   Habitat of Mammals

The method is carried out by going through a transect (path) with the provisions of the plot to be observed in the form of zig-zag or alternately. Plots used were 20 x 20 m2 each consisting of four plots, 2 x 2 m2 for seedlings, 5 x 5 m2 for saplings, 10 x 10 m2 for poles and 20 x 20 m2 for trees [14].

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[14] Soerianegara, I. dan Indrawan A. 1998. Ekologi Hutan Indonesia. Laboratorium Ekologi, Fakultas Kehutanan, Institut Pertanian Bogor. Bogor

A. Data Analysis

a. Species Richness Index (Dmg)[15]

$$D_{mg} = (S\text{-}1)/ \ln (N)$$

Keterangan :

Dmg : Species Richness Index
S : Total Species
N : Total Individual

b. Species Diversity (H')

Shannon-Wiener [16]:

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

Keterangan :

H' : Species diversity
Pi : n/N

c. Eveness Index Krebs (1978) :

E = H' / Log S

Keterangan :
H' : Shannon Index
S : Total Species
E : Eveness Index

III. RESULT AND DISCUSSION

A. Mammals Diversity

1. Richness Index

The types of mammals found in tropical rain *Tupaia javanica*, *Trachypithecus auratus*, *Sus scrofa*, *Panthera pardus*, *Paradoxurus hermaprodithus*), meanwhile the types of mammals found in open fields are *Felis domesticus* and *Suncus murinus*.

Based on the table 1 of species richness, it can be seen that the most commonly found mammals are the *Tupaia javanica* with an estimated value of about five individuals Which have a habit of living in

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[15] Magurran, *loc.cit*
[16] Krebs, C.J. 1978. Ecology The Experimental Analysis of Distribution and Abundance. New York: Harper & Row Publisher.

secondary forests and gardens[17]. This is by the condition of the forest in Mandalawangi Resort which is included as a secondary forest. The tropical rainforest at Mandalawangi Resort is dominated by rasamala trees whose fruit is used by squirrels as food. *Tupaia javanica* like foraging in small trees or shrubs[18]. Willingness to spread food in the forest causes the spread of *T. javanica* quite extensive, and the location of feed close to the observation path makes it easy to find the chipmunks.

The fewest types of mammals found were *Paradoxurus hermaproditus* and *Panthera pardus melas*. Leopards are very rare because the status of these mammals is protected and the numbers of individual are low (UU No. 5 of 1990)[19].

Tabel 1. Species Richness of Mammals

No	Species	Famili	Total	Conservation Status (IUCN)
1	*Trachypithecus auratus*	Cercopithecidae	4	Vulnerable
2	*Tupaia javanica*	Tupaidae	5	Least concern
3	*Sus scrofa*	Suidae	2	Least concern
4	*Suncus muricus*	*Soricidae*	1	Least concern
5	*Panthera pardus melas*	*Felidae*	1	Critically endangered
6	*Felis domesticus*	*Felidae*	3	Least concern
7	*Paradoxurus hermaphroditus*	*Viverridae*	1	Least concern

2. Diversity Index

The species diversity index value is in the low diversity category with a value of 0.25. The low diversity index value is determine by the few species found that is in accordance with the statement of Soegianto (1994) in Nento et al., 2013[20] which states in a community that has a high diversity if many species compose the community, meanwhile if very few dominant species compose the community, the diversity of species is low . Another factor is the existence of tourism activities in the Mandalawangi Resort area. Wildlife life can be disrupted if its habitat changes due to very disturbing activities around it. That is because animals have a strong sensitivity to changes in their habitat environment. Changes or disturbance to the habitat can cause the movement of animals to avoid[21]. There are more mammals in the tropical rainforest than mammals found in open fields. The diversity

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[18] *Ibid*

[19] Undang-Undang Republik Indonesia Nomor 5 Tahun 1990 tentang Konservasi   Sumberdaya   Hayati   dan Ekosistemnya.

[20] Nento R, Sahami F, Nursiar S. 2013. Kelimpahan, Keanekaragaman, dan Kemerataan Gastropoda di ekosistem Magrove di Pulau Dudepo, Kecamatan Anggrek, Kabupaten Gorontalo Utara. Jurnal Ilmiah Perikanan dan Keluatan 1(1): 41-47.

[21] Winarno GD, Harianto SP. 2018. Perilaku Satwa Liar (Ethology). Bandar Lampung: AURA

of habitat types and their quality will affect the number and types of wildlife[22]. The tropical rain forest in Mandalawangi Resort has vegetation which is a source of food, a place to live, and shelter, whereas open land does not have enough vegetation to support animal life.

3. Eveness Index

The species diversity index value is in the low diversity category with a value of 0.25. The few species determine the low diversity index value found that is in accordance with the statement of Soegianto (1994) in Nento et al., 2013[23] which states in a community that has a high diversity if many species compose the community, meanwhile if very few dominant species compose the community, the diversity of species is low . Another factor is the existence of tourism activities in the Mandalawangi Resort area. Wildlife life The index value belongs to the unstable community category (0.15), i.e. individuals for each type of equality are low. The index value also affects the distribution of animals. Animals will tend to live in an area that is easy to get food. Tropical rain forests have more vegetation as mammal feed and shelter compared to open land. According to Odum (1996) in Nento et al. (2013) that the distribution of animals based on food factors.

4. Distribution and Patterns

Distribution is an effort used by wildlife to maintain their survival[24](Alikodra, 1990). Distribution patterns of wildlife divided into vertical and horizontal, which can be random, uniform or grouped. Distribution patterns are determined based on the individual of each type identified in each research plot. The distribution patterns of mammals that found at Mandalawangi Resort divided into mammals that live on trees (arboreal) and live on land (terrestrial) which is shown in Fig.1. Based on the figure, it can be seen that the distribution patterns for each type of mammal are different. The distribution pattern of mammals found at Mandalawangi Resort divided into mammals that live on trees (arboreal) and live on land (terrestrial). The types of mammals that live on trees are *Trachypithecus auratus*, *Tupaia javanica*, and *Paradoxurus hermaproditus*. Mammals that live on the ground are *Suncus murinus, Sus scrofa, Felis domesticus* and *Panthera pardus*.

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[23] Nento, *loc.cit*

[24] Alikodra HS. 1990. Pengelolaan Satwa Liar Jilid I. Depatemen Pendidikan dan Kebudayaan, Direktorak Jenderal Pendidikan Tinggi, Pusat Antar Universitas Ilmu Hayati, Bogor: IPB
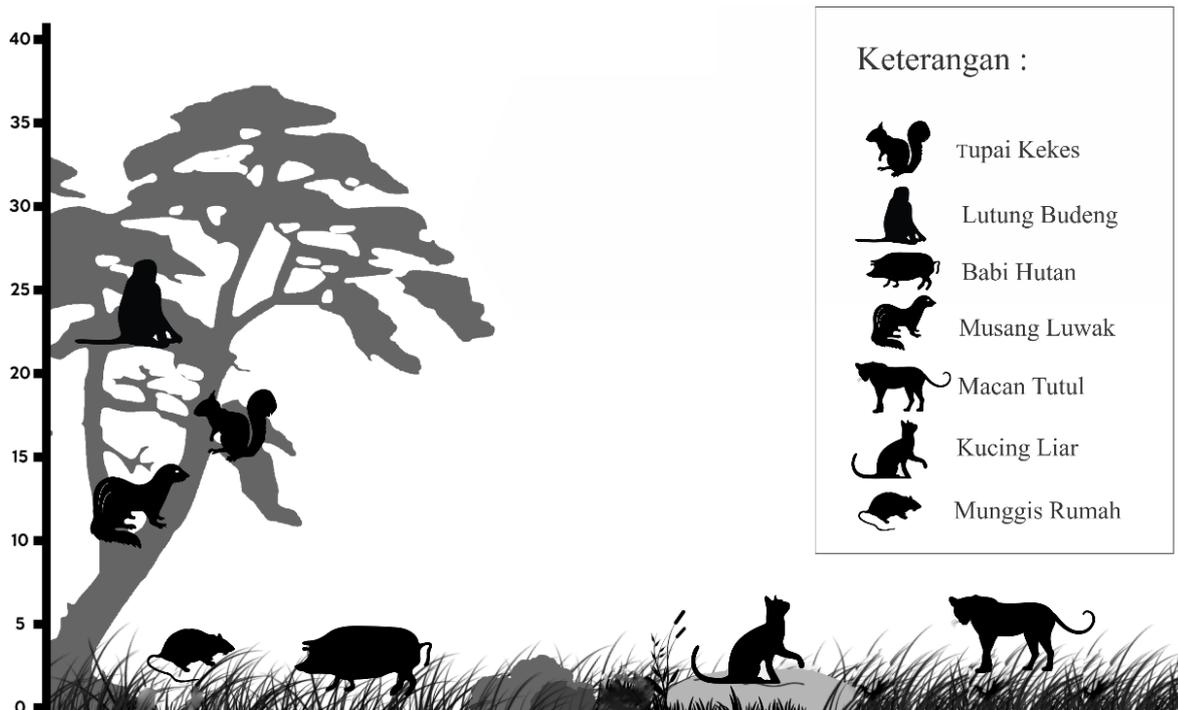
Figure 1. Distribution and Patterns of Mammals

B.   Habitat of Mammals

There was a positive relationship between the habitat complexity and the abundance of species. The tropical rain forests at Mandalawangi Resort include secondary forests with mixed vegetation types between lowland forest and mountain vegetation. The most dominant tree-level vegetation is *Agathis damara* with 66.50% INP. Vegetation in tropical rain forests is used by mammals as feed material to support their lives. Meanwhile, the vegetation of trees found is *Slonea sigun, Altingia excelsa, Agathis dammara, and Pinus merkusii.* Water sources found at Mandalawangi Resort are water, rivers and lakes. The flow of water comes from the river that passes through Mandalawangi Resort. water flow conditions with a pH of 7 (neutral) with a brightness of 90-100%. The river has a passage of about 500 m with an average depth of 30 cm. The condition of neutral river water with a pH of 6-7 and has a brightness of around 90-100%. Lake in Mandalawangi Resort has a pH of 7 with a brightness of 80-90%, depth of 1-5 m and an area of about 500 m2. Human activities that are often carried out at Mandalawangi Resort are camping and outbound. Other activities carried out around the Mandalawangi Resort are selling food and drinks carried out by the surrounding community.

IV.   CONCLUSION

Mammals found at Mandawalangi Resort consist of 7 types of mammals from 6 families. Species richness index and species diversity index are low. The highest level of mammal species encounter is *Tupaia javanica*. Evenness index is included in the unstable community category (0.15). Mammal habitat at Mandalawangi Resort is divided into two namely tropical rainforest and open land. Density conditions in tropical rain forests are quite dense, and the dominant tree is damar Agathis damara

with an INP of 66.50%. Open land there are several types of trees, there are *Altingia excelsa, Agathis dammara, Pinus merkusii.*

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