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## Fauna biodiversity as one of Repong Damar forest health indicators

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## PREFACE

It is a great honor for us, Faculty of Forestry of Hasanuddin University, to host the 2<sup>nd</sup> Biennial Conference of Tropical Biodiversity 2021 (BCTB) 2021 on August 4<sup>th</sup> - 5<sup>th</sup>, 2021, in Makassar City of South Sulawesi Province, Indonesia. This conference is a series of international scientific seminars held by the Faculty of Agriculture, Universitas Hasanuddin, Makassar, Indonesia, held biennially since 2018. In addition, The proceedings of BCTB have been published in the IOP conference series: Earth and Environmental Science (EES).

Biodiversity is evenly distributed and varies widely across the world and within regions, the diversity of which is highly dependent on environmental factors such as temperature, rainfall, altitude, soil geography, and the presence of other species. Biodiversity is also essential in supporting ecosystem services, including air quality, climate, carbon dioxide absorption, water purification, pollination, and erosion prevention. Rapid environmental changes have led to many mass extinctions of species. Therefore, protecting its existence has become one of the most significant challenges humanity has to face.

The Biennial Conference of Tropical Biodiversity is a scientific forum to enhance science and technology, together with researchers, scientists, practitioners, and scholars to anticipate the impacts of climate change in biodiversity. This is also conducted to promote Sustainable Development Goals (SDGs). Hence, this conference chose an SDGs-related theme, namely **“Managing Challenges in Biodiversity Conservation During The Pandemic to Achieve Sustainable Development Goals for Better Environment”** with six sub-themes:

1. Assessment of global biodiversity: the impact of a pandemic to biodiversity.
2. The existence of genetic diversity to maintain biodiversity.
3. Community partnership for biodiversity conservation.
4. Biodiversity and utilization.
5. The conservation of tropical biodiversity: current challenges for the management.
6. Ecological risk and natural disaster.

The Biennial Conference of Tropical Biodiversity will be held every two years. The first was in 2018, and the second should be in 2019. Due to the Covid-19 outbreak, the conference was postponed to be this year (2021). Hence, the conference model has performed with a virtual conference instead of a live meeting.

This conference presents keynote speakers from 5 countries, namely Prof. Enrico Bonello from Ohio State University, USA, Dr. Doan Nainggolan from Aarhus University-Denmark, Prof. Erin P. Riley from San Diego State University-USA, Dr. Ida Ayu Pradnya Resosudarmo from Australian National University-Australia, and Prof. Supratman from Hasanuddin University-Indonesia. The plenary session and discussion for all speakers were for 3 hours. Participant presentations (oral and video presentations) were held in 3 sessions, and each session was divided into ten rooms. The number of participants per room was 15-20 participants with an allocation of presentations for 5 minutes/participant conducted in parallel as many as three parallel sessions. Discussions sessions were held in parallel in each parallel session with an allocation of 3 minutes per participant. The Virtual BCTB conference implementation applied the zoom meeting application provided by the Faculty of Forestry, Universitas Hasanuddin.



This international conference is attended by around 250 participants from 6 countries (USA, Denmark, Australia, Italy, Finland, and Indonesia), including keynote speakers, oral presenters, and participants. The participant consists of 31 Universities and 13 forestry-related institutions. We received 202 abstracts in total, but after the review process, the committee accepted 187 abstracts and rejected 15 abstracts because they didn't fit the sub-themes. The conference will be held on August 4<sup>th</sup> - 5<sup>th</sup>, 2021.

We wish to convey my appreciation to the Rector of Hasanuddin University and the Dean of Forestry Faculty for their support to ensure the success of this conference.

Finally, we sincerely thank all committee members and a volunteer team of the Forestry Faculty, Hasanuddin University, who all have total commitment and work hard for this international conference. Our sincere thanks also to all parties, including session chairs, Publication Management Center (PMC) of Universitas Hasanuddin, all speakers, all authors, and participants that make this conference meaningful and happening. Sincerely thank you for your generous support, and we look forward to working with you in the future.

Warm Regards,

Mukrimin, S.Hut., MP., Ph.D

Chairman of 2<sup>nd</sup> BCTB 2021

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# Fauna biodiversity as one of Repong Damar forest health indicators

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**Abstract.** Repong Damar Pekon Pahmungan has a diverse fauna, especially primates. Primates have great benefits for forest sustainability, because the fruit seeds ingested by primates will help spread biodiversity and forest regeneration. The presence of primates can also be an indicator of forest health. The health condition of the repong damar forest is very influential on its sustainability so that one of the health indicators that can be used is biodiversity. Biodiversity of fauna can be identified by using the FHM (Forest Health Monitoring) method to determine the diversity and condition of its health status. Repong Damar has a diversity of primate fauna, namely long-tailed monkeys and gibbons found in cluster plots 3 and 5. Based on this, Repong Damar Pekon Pahmungan has poor forest health status.

## 1. Introduction

Repong damar is a natural resource management system that is managed directly by the people of the West Coast, Lampung [1]. The planting system in repong damar is agroforestry consisting of various types of plants that live productively, are conserved, and used directly by the community for generations. The abundance of plants in repong damar makes the presence of diverse fauna, such as gibbons, long-tailed monkeys, cecah, gray langurs, and others [2]. The thing that causes the diversity of fauna in repong damar is the presence of tree plants that provide food resources, especially as a place to find food, shelter, and breed [3].

The presence of primates in repong damar can be an indicator of forest health, a healthy population in the forest area, and it is also likely that other types of animals are still in considerable numbers. According to Pangestu *et al.*, (2020), forest health is one of the indicators for achieving forest sustainability [4]. One of the indicators used in assessing the health of the repong damar forest is faunal biodiversity.

Until now, serious attention in sustainable forest management in Lampung province is still lacking, even though awareness of forest health is very important [5]. The health condition of the repong damar forest greatly influences the sustainability of its ecosystem. The that can be steps taken to ensure the benefits and functions of forests are by measuring forest health [6]. The health condition of the repong damar forest greatly influences the sustainability of its ecosystem. Therefore, it is important to conduct this research to determine the health condition status of the Repong Damar forest by using one of the indicators of forest health, namely fauna biodiversity, based on the diversity index.



## 2. Research method

This research was conducted in February 2021, located in the forest of Repong Damar Pekon Pahmungan, Pesisir Barat Regency. The tools used in the research are: binoculars, *tally sheet*, digital cameras, digital clock, and the Indonesian Primate Field Guide, and the Indonesian Primate Tourism book [7,8]. While the object of this research is the primate fauna in the Repong Damar forest.

### 2.1. Data collection

Collection Fauna data collection was carried out using the FHM (method *Forest Health Monitoring*). The FHM method is a method used for forest health assessment, where one cluster plot consists of four plots. The FHM cluster plots made in this study were 5 clusters of FHM plots with the consideration that the data samples were able to represent the population based on the area of the sampling area. The purpose of FHM is to provide information on forest conditions every year and to assess the status and condition of forest ecosystems in all forest lands. Data were collected and analyzed to find out the latest condition of various forest ecosystem indicators [9]. The indicator used is fauna (primate) biodiversity. This information is used to make forest management decisions [10].

Primate observations were only carried out at the center point of plot 1 for 30 minutes in each plot cluster to prevent double counting. Observations were made twice for each cluster, namely in the morning at 06.00-10.00 WIB and in the afternoon at 15.00-17.00 WIB. This time was chosen because in the morning and evening, primates are actively doing activities, so it is easier to find them.

### 2.2. Data analysis

Analysis Quantitative data analysis was conducted to obtain data on the diversity of bird species and epifauna, indicator scoring scores, and the final score of the health condition of mangrove forests. The formulas used in processing data include:

2.2.1. *Species diversity index (H')*. The species diversity of an individual can be determined using the equation, namely the Shannon-Wiener diversity index.

$$H' = \sum(P_i \ln P_i) \quad (1)$$

Information:

H' = index of fauna species diversity;  $P_i = n_i/N$ ;

$N_i$  = number of individuals of the 1st type; and N = number of individuals of all types.

2.2.2. *Scoring*. Value The scoring value is determined based on the diversity index value category, which consists of 3 categories, namely (low, medium, and high diversity). The higher the score, the higher the health level of the mangrove forest. The category of health conditions of the Repong Damar forest is good (good), moderate (moderate), bad (poor) [11]. Class values for each category were obtained based on the final value of the repong damar forest condition (NKHr) in each cluster plot.

### 2.3. The final value of forest health conditions in repong damar (NKHr)

According to Safe'i and Tsani (2016), the final value of forest health conditions is the result of multiplying the weighted value with the parameter score of the indicator used, namely biodiversity [11]. According to Safe'i et al., (2013), the weighted value is a parameter of each repong damar health indicator [12]. The weighted value of the biodiversity indicator is 0.33 [5]. The final value of the health condition of the repong damar forest is calculated using the equation

$$NKHr = \sum (NTXNS) \quad (2)$$

Information:

NKHr = the final value of the health condition of the repong damar forest;  
 NT = parameter weighted value of the repong damar forest health indicator;  
 NS = parameter score of the repong damar forest health indicator

### 3. Results and discussion

The success of agroforestry community forests which are run by local communities in a traditional and very good manner requires attention in managing forest land. Repong Damar Pekon Pahmungan is an example of a community forest that is still preserved. Local people used to call Repong damar with the term damar garden. Repong damar holds many benefits for the local community, especially as a source of income. As for other living things such as primate fauna, the existence of repong damar is used as a place to find food, shelter, as a place to live and breed [13],

Fauna, especially primates, is a natural resource that must be preserved because it has the potential to be utilized and has its own charm for human life [14]. The level of diversity is directly proportional to the level of flexibility, where the higher the level of biodiversity in a forest, the higher the level of forest flexibility (Table 1) [15].

**Table 1.** Diversity of primate species in the forest of Repong Damar, Pekon Pahmungan, Pesisir Barat Regency.

Family	Type of fauna	Scientific name	Number of	Cluster plots
Hylobatidae	Siamang	<i>Symphalangus syndactylus</i>	2	5
Cercopithecidae	Tailed	<i>macaque Macaca fascicularis</i>	4	3
	Long-		2	5
Total number			8	

**Table 2.** Value of faunal diversity (H') in the forest of Repong Damar, Pekon Pahmungan, Pesisir Barat Regency.

Cluster plot FHM	Value of fauna species diversity (H')
3	0.34657
5	0.34657

Based on Table 2, the faunal diversity that has been found in the study has a total of 2 families consisting of families hylobatidae and cercopithecidae.

**Table 3.** Class scores for the diversity of fauna species in the forest of Repong Damar, Pekon Pahmungan, Pesisir Barat Regency.

Cluster plot	Score score (NS)	Weighted score (NT)	Final score of health condition of forest repong damar	Status Health
1	1	0.33	0.33	Poor
2	1	0.33	0.33	Poor
3	9	0.33	2.97	Good
4	1	0.33	0.33	Poor
5	9	0.33	2.97	Good

In Table 3, it is known that the health status of the forest of Repong Damar, Pekon Pahmungan, Pesisir Barat Regency has 40% good condition, 0% moderate, and 60% in poor condition. Poor ecosystem conditions exist in cluster plots 1, 2, and 3, this is because in cluster plots 1, 2, and 3 due to the suitability of environmental conditions (the ability of primates to adapt to the environment), this could be due to the possibility that these primates do not exist. At the observation site, or because these primate species are pressed for food so they are difficult to find. In addition, plots 1, 2 and 3 are very close to residential areas, so primates are reluctant to enter the area.

Factors that can affect the number of populations include habitat conditions, food availability, presence of predators and human activities. The low population of gibbons at the time of observation was due to habitat conditions that were no longer suitable and insufficient food sources, resulting in this group of primates expanding their range, making them difficult to find [14]. This is similar to the statement Chivers (1972) that the source of feed determine the size of the home range, which means that increasingly scarce food, it will be far and wide range areas for foraging [16].

Based on the survey results revealed that the species most frequently encountered are the long-tailed macaque (*Macaca fascicularis*); this shows that long-tailed monkeys have a better adaptation pattern than other mammalian primates. In addition, the movement of animals is closely related to individual characteristics and environmental conditions such as food supplies, facilities for development, climatic/weather conditions, predation and water sources, they move to find food, to live, and to breed freely [13].

The existence of primates in repong damar is threatened by increased human activities, such as the increase in the population around the area. The primate population is greatly influenced by the conditions of their habitat, which provides a source of food and a place to live. The number of long-tailed monkeys in this area, because long-tailed monkeys like to live near water areas in the lowlands, in these areas have temperatures warmer. If we look at the behavior patterns of long-tailed monkeys, which are flexible to habitat conditions and human presence, their presence is not always abundant because it indicates that the existence of these primates is being pushed by the clearing of fields and hunting.

#### 4. Conclusion

Repong damar forest of Pekon Pahmungan Pesisir Barat Regency has the largest diversity value (H') of 2.97, which belongs to the good category, and the lowest diversity of 0.33 which belongs to the low category so that the value of the health condition of the mangrove forest is 40% good, 0% moderate and

60% in poor condition.

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