



Amphibian Distribution on Degradated Habitat in Pasir Bintang and Manduriang District Gunung Raya Wildlife Sanctuary Area of South Sumatra Province.

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Abstract

Amphibian distribution on degraded habitat in Pasir Bintang and Manduriang districts of the Gunung Raya Wildlife Reserve, South Sumatra Province is caused by human activities, namely illegal logging and coffee plantations. Amphibians are one of the components that make up ecosystems that are very sensitive to environmental changes. This study aims to know the pattern of the amphibian species distribution on degraded habitat as a first step in conserving them. The method used is a line transect combination method with an encounter survey or Visual Encounter Survey (VES) with a time search of 3 hours in both aquatic and terrestrial habitats and the coordinates of the encounter are recorded. Trap by using a drift fence and pitfall traps at the affected location and also by using the interview method with the surrounding community and forest police. Determination of the distribution of amphibians is done by mapping the coordinates of the encounters that have been recorded using GPS with the help of the location of the coordinates on Google Earth into the amphibian distribution map. The results obtained are in the form of mapping the coordinates of amphibian encounters in the affected area. The conclusion of this study is the distribution of amphibian species in degraded habitat that have been encroached by illegal logging and coffee plantations are very few types and limited distribution due to habitat destruction and the small amount of food available.

Keywords : Degradated Habitat, Amphibian Distribution, Illegal Logging, and Coffee Plantation.

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1. Introduction

Amphibians are one of the components of ecosystems that have an important role and are very sensitive to environmental changes [1]. The diversity of amphibian species in Indonesia is the largest in the world, but research on amphibians in Indonesia is still very little [2].

The amount of amphibian diversity in South Sumatra is quite high because the ecosystem is peat swamp and lowland and highland forest and there is a lot of vacant land which is a potential habitat for amphibians [3]. The existence of forests is increasingly concerning due to human activities, causing the amphibian habitat to decrease. Habitat degradation caused by loss of vegetation

has had many impacts on the number of amphibians [4].

Gunung Raya Wildlife Reserve which has been established based on the Decree of the Minister of Agriculture number: 55/Kpts/Um/1/1978 with an area of 39,500 ha. The vegetation in the area around the Gunung Raya Wildlife Reserve is a highland tropical rain forest ecosystem with undulating, hilly and mountainous topography with an altitude of 1,643 meters above sea level. Some of the Gunung Raya Wildlife Reserve Areas, which is 70%, have been encroached by the community into coffee plantation areas and illegal logging, especially in the Pasir Bintang and Manduriang [5].

This study aims to know the pattern of amphibian species distribution at habitat degraded in the Gunung Raya Wildlife Reserve Area and to determine the habitat conditions and environmental factors that are suitable for

the initial step of conserving them.

2. Materials and Methods

This research was carried out from January to June 2020 with two repetitions of the research at the Gunung Raya Wildlife Reserve, precisely in the Pasir Bintang and Manduriang Districts. The tools used in amphibian observations use GPS (Global Positioning System), head lamps, cameras, plastic bags of various sizes, roll meters, latex gloves, plastic or raffia ropes, and jars.

The research methods and techniques used a combination of Line Transects and Visual Encounter Surveys (VES), namely the collection of animal species based on direct encounters on paths in both terrestrial and aquatic areas [6]. The method used is time search for 3 hours in both terrestrial and aquatic habitats. This method begins by forming a point of observation location, then proceeds with making an observation path using tools such as ropes and roll meters. The length of the transect is usually about 200-400 meters for aquatic habitats and 800-1000 meters for terrestrial habitats [7][14]. The length of the observation path depends on the condition of the observation path itself [8].

The time and coordinates of the start and end of each transect must be recorded. The survey was carried out from the starting point to the end point of the transect by observing and recording the types of amphibians seen. The research line is divided into 4 transect lines, namely transects 1 and 2 are terrestrial habitats and transects 3 and 4 are aquatic habitats. Observations were made in the morning (07.00-10.00 WIB) and at night (19.00-22.00 WIB). The 4 lines tran-sect was used for two study sites.

The types of data collected include the research location, species name, number per individual at each observation location, and coordinate points. The identification of the species obtained was based on [1], [9], and [10]. Furthermore, every encounter with an amphibian or its indicators such as sound, the coordinates of its position are recorded using GPS. Determination of the distribution of amphibians is done by mapping the coordinates of the encounters that have been recorded using GPS with the help of the location of the coordinates on Google Earth into the amphibian distribution map.

The method of interviewing the surrounding community and forest rangers regarding the types and numbers that are often found in the two research locations recorded descriptively can be additional data in the study.

3. Results and Discussion

Based on the results of the research that has been carried out, the results obtained are 11 species from 5 families consisting of the *Dicroglossidae*, *Rhacophoridae*, *Megophryidae*, *Microhylidae*, and *Bufo* families.

Table 1. The coordinates of the encounter of amphibian species in the Pasir Bintang and Manduriang districts.

Locate and Species Name	ST	Coordinate Point	
MANDURIANG			
<i>Ferjervarya cancrivora</i>	1	4°42'37" S 103° 56'55" E	
	2	4°42'10" S 103° 58'46" E	
	<i>Ferjervarya limnocharis</i>	1	4°40'08" S 103° 58'42" E
		<i>Ocydozyga laevis</i>	1
	<i>Phrynooidis aspera</i>	1	4°41'36" S 103° 58'16" E
		2	4°41'37" S 103° 58'15" E
		3	4°42'27" S 103° 58'10" E
4		4°42'35" S 103° 58'19" E	
<i>PASIR BINTANG</i>	5	4°43'05" S 103° 58'37" E	
	6	4°43'33" S 103° 58'02" E	
	7	4°43'28" S 103° 57'42" E	
	<i>Ferjervarya cancrivora</i>	1	4°54'39" S 104° 07'25" E
		2	4°54'53" S 104° 07'30" E
		3	4°54'48" S 104° 07'42" E
		4	4°54'41" S 104° 08'07" E
5		4°54'33" S 104° 08'47" E	
6		4°54'09" S 104° 08'36" E	
7		4°53'32" S 104° 08'05" E	
<i>Ferjervarya limnocharis</i>	1	4°54'41" S 104° 08'09" E	
	2	4°54'55" S 104° 08'18" E	
	3	4°54'48" S 104° 08'04" E	
<i>Polypedates leucomystax</i>	1	4°54'17" S 104° 07'38" E	
	2	4°54'26" S 104° 08'01" E	
	3	4°54'43" S 104° 08'40" E	
	4	4°55'03" S 104° 08'44" E	
	5	4°55'07" S 104° 08'31" E	
<i>Rachophorus achantharrhena</i>	1	4°54'05" S 104° 08'30" E	
<i>Megophrys nasuta</i>	1	4°54'20" S 104° 08'21" E	
<i>Kalophrynus pleurostigma</i>	1	4°54'30" S 104° 08'37" E	
<i>Duttaphrynus melanosticus</i>	1	4°54'37" S 104° 07'05" E	
<i>Ingerophyrus bipocartus</i>	1	4°54'43" S 104° 07'45" E	

Based on Table 1, 11 species were obtained from 5 families with a total of 32 individuals, with details of 21 species of amphibians in the Pasir Bintang district and 11 specieses in the Manduriang district. In these two districts, there have been many human activities in the form of illegal logging and coffee plantations which have caused habitat degradation, thus affecting the distribution, number of individuals, and types of amphibians in the area. The species *Ferjervarya cancrivora* dominated the Pasir Bintang district and the *Phrynooidis aspera* species dominated the Manduriang district with a total of 7 individuals each.

Ferjervarya cancrivora and *Phrynooidis aspera* were the most common amphibian species found in all study sites with 7 individuals each. According to [11], this

species is generalist in that it is able to adapt to various types of habitats. Generally this species is found along the banks of rivers with slow to fast currents in primary forests, secondary forests, plantation areas or human settlements not far from the forest. But according to [7], *Fejervarya cancrivora* and *Fejervarya limnocharis* prefer disturbed habitats.

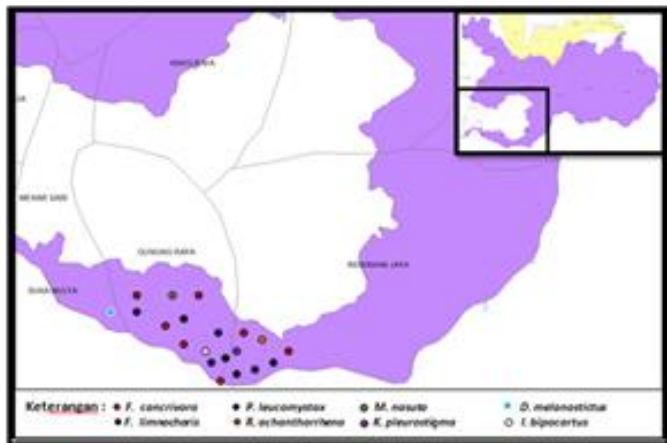


Figure 1. Distribution Map of Amphibian Species found in the Pasir Bintang district of the Wildlife Sanctuary of South Sumatra Province.

Based on Figure 1. in the Pasir Bintang district with details of 7 species of *Fejervarya cancrivora*, 3 species of *Fejervarya limnocharis*, 5 species of *Polypedates leucomystax*, 1 species of *Rhacophorus achantharrhena*, 1 species of *Megophrys nasuta*, 1 species of *Kalophrynus pleurostigma*, 1 species of *Duttaphrynus melanostictus*, and 1 species of *Incartusophrynus*. The number of species *Fejervarya cancrivora* dominates the Pasir Bintang district because this species is common and occurs in any habitat type. According to [7], the species *Fejervarya cancrivora* generally likes disturbed areas and has high adaptation in various types of habitats.

The Pasir Bintang district experienced less severe encroachment compared to the Manduriang district. This is comparable to the discovery of more amphibian species in Pasir Bintang than in the Manduriang district. The results of interviews with local communities and forest rangers regarding species that are often found in the Pasir Bintang District are *Fejervarya cancrivora*, *Fejervarya limnocharis*, and *Megophrys nasuta*. Habitat that has been encroached by the community for coffee plantations and illegal logging greatly affects the number and distribution of amphibian species in the Pasir Bintang District.

The Pasir Bintang area is a highland habitat with open vegetation, lots of water sources, and there are many coffee plantations but little illegal logging activities. Meanwhile, Manduriang is a highland and lowland habitat in the form of a river that flows throughout the year with dense vegetation, it is a source of water and a reproductive

medium for amphibians. According to [1], that amphibians are strongly associated with water to maintain a stable body temperature humidity.

The Manduriang district area is part of the Gunung Raya Wildlife Reserve area, which is located close to the highway, which is located in the Simpang Sender Utara sub-district. This is what allows for fewer amphibian species compared to the Pasir Bintang district even though the Manduriang District's habitat is better in terms of canopy cover and river or aquatic habitat. And the factor is close to the highway that allows disruption of human activities in the form of habitat degradation to be greater.

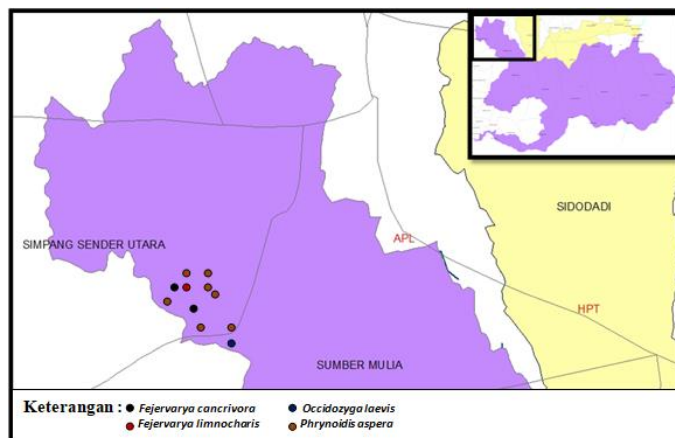


Figure 2. Distribution Map of Amphibian Species found in Manduriang District, Wildlife Reserve Area, South Sumatra Province.

Based on Figure 2. in Manduriang district with details of 2 species of *Fejervarya cancrivora*, 1 species of *Fejervarya limnocharis*, 1 species of *Occidozyga laevis*, and 7 species of *Phrynosia aspera*. The distribution of 4 amphibian species in the Manduriang district, if seen from the map, it can be concluded that the distribution of amphibian species shows a clustered pattern, this indicates the presence of food gathered in one place. In addition, the Manduriang district is a lowland area with river flows and dense vegetation cover. However, in terms of the number of species, the Manduriang district area is less than the Pasir Bintang district due to the very high habitat degradation in the Manduriang district

The distribution of species is highly dependent on the ability of animals to utilize resources. Species that are commonly encountered are usually species that are able to use all available resources. Line transects may not be able to produce ecological data of all types. According to [7], it is necessary to record the condition of the habitat of the species (eg dominant plants, percentage of canopy cover, thickness of litter, distance from water sources and others) is very important to do to see the relationship between habitat characteristics and the distribution of amphibian species.

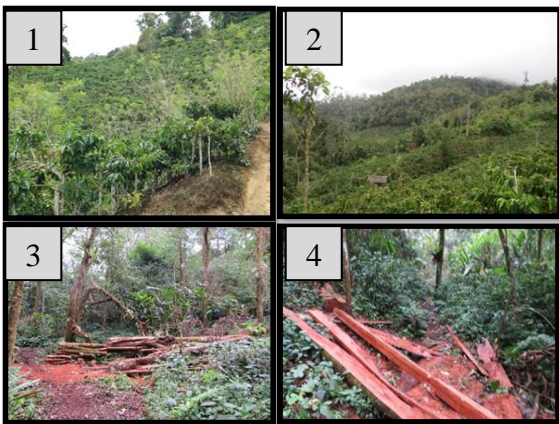


Figure 3. Examples of habitat degraded in the Gunung Raya Wildlife Reserve are coffee plantations (1) Pasir Bintang District and (2) Manduriang District and illegal logging (3) Pasir Bintang District and (4) Manduriang District.

The degraded habitat in the districts of Pasir Bintang and Manduriang is very high causing the limited number and distribution of amphibian species in both districts. It's just that the difference in the two districts, one shows a clustered and random pattern. The impact of habitat degradation causes a decrease in environmental quality so that the amount of food available is also limited. According to [12], habitat degradation is a series of events that have an impact on the decline in environmental quality or a decrease in the carrying capacity of the environment caused by humans or caused by nature.

The relationship between high habitat degradation in the Pasir Bintang and Manduriang districts has an impact that is directly proportional to the limited distribution of amphibian species in the two districts. According to [13], habitat degradation breaks the habitat into small parts. As a consequence the range of animals is getting narrower, their movement is also not free. In addition, animal populations can be separated. Genetic diversity is also reduced. Habitat degradation is the biggest threat to animal species, especially amphibians. Evidently many species of amphibians are lost in large numbers. If this habitat destruction continues, then future amphibian extinctions will occur.

The impact of habitat degradation greatly affects the distribution of amphibian species in the two districts due to the limited space for amphibians to move in foraging, breeding, and other amphibian activities due to the carrying capacity of the habitat and habitat quality decreased drastically due to human activities in the form of coffee plantations and illegal logging.

4. Conclusion

Based on the research that has been carried out, the following conclusions can be drawn:

1. The random distribution pattern in the degraded habitat in Manduriang is caused by the location close to the highway so that there are more human activities, there are many rivers flowing, and the altitude is low.
2. The distribution pattern of clusters in degraded habitats in the Bintang Sand is caused by the high altitude, segmentation of coffee plantations, and the lack of river flow in that area.

5. Conflict of Interest

More detailed research on the impact of habitat degradation on the distribution of amphibian species should be carried out in two seasons, namely the dry season and the rainy season in order to know the differences in species and distribution patterns.

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