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THE IMPACT OF PALM OIL PLANTATIONS ON BIRD DIVERSITY IN PALM OIL ESTATES IN NAGARI SALAREH AIA, PALEMBAYAN SUB-DISTRICT, AGAM DISTRICT

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ABSTRACT

This study aimed to see the effect of the existence of oil palm agricultural land on bird populations in the Agam area of West Sumatra Province. Observations were made directly by taking primary and secondary data.The species of birds that were identified during the observations were Pycnonotus goiaver (Merbah Cerocok) important value index 68.75 %, Streptopelia chinensis (Tekukur) IVI 42.50, Prinia familiaris (Prenjak Java) IVI 35.00 %, Colocalia esculenta (Cow Swallow) IVI 18.75 %, Copsychus saularis musicus (Murai) IVI 13.75 %, Halcyon smyrnensis (Javanese gecko) IVI 8.75 %, Rhipidura javanica (Stripe fan) IVI 6.25 % and Porzana cinerea (White Eyebrow Rat) with IVI 6.25%. The diversity of bird species in the oil palm plantations is low because only 8 bird species were found. The results of this study were basic data that need to be developed because there are effects that need to be multiplied further. The existence of oil palm plantations has an effect on the diversity of animal populations, especially birds around the land.

Keywords: ecosystem, community, observation, population,

1. INTRODUCTION

This research was a preliminary study in oil palm plantations on bird macro fauna. Birds are an important part of biodiversity, where birds are living things that can be used as good indicators of changes in environmental ecology, they play a large and important role for many communities on land and water (Mekonen, 2017). In addition, birds are also one of the natural resources that have high value both in terms of ecology, science, economy, recreation and culture. Ecologically, birds function as a balancer in the food chain in ecosystems, help pollinate plants, as pest predators and as seed dispersers for several plant species.

Birds are animals that are very close to humans and we must preserve their diversity (Ramdhani, 2008). It is estimated that 17% (1521 species) of all bird species in the world are found in Indonesia, with 381 species of which are endemic bird species (Prawiradilaga, 2017). While on the island of Sumatra and the surrounding small islands there are 397 species, 22 species (6%) of which are endemic species (Novarino and Salsabila, 2003; Halik, 2022).

Sumatra is an island with the lowest level of endemic birds among the islands in Indonesia. This relates to the geological history of its separation from the Asian plains. Sumatra has 306 species of birds (77%) which are also

found in Kalimantan, 345 species (87%) which are found on the Malay Peninsula and 211 species (53%) which are found in Java. Forest clearing for oil palm plantations will generally have an impact on the condition of the biota in an ecosystem. With the ever increasing population, more and more forests are being converted into oil palm plantations. Nagari Salareh Aia is one of the Nagari in Agam Regency. Most of the inhabitants work as farmers. The agricultural sector he works on is oil palm plantations, rice fields and vegetables. But the dominant one is oil palm plantations. As a result of this activity, the forests around Nagari have undergone changes, namely they have become plantations. This change in conditions affects the condition of the wild animals in it, one of which is birds. Ciach and Fröhlich (2017) stated that rhythms in the supply of food resources and their abundance determine the pattern and manner of habitat use by many bird species. Forest vegetation will provide a lot of food resources when compared to plantation areas. Yanto (2006) stated that in the Limited Production Forest area on Enggano Island, the largest group of birds is from the insectifore group. Because forest vegetation is very diverse, it can provide a high enough source of food in the form of insects. It is different in plantations where the vegetation types are uniform, so that it will affect the diversity of bird species. Because birds are very sensitive to changes in the environment around them. So it is suspected that in oil palm plantations the diversity is reduced.

The first stage of making oil palm plantations which greatly affects the loss of bird habitat is clear cutting land clearing. The stages of this activity change the structure, type and composition of vegetation from forest to shrubs at the beginning of oil palm planting. This activity also causes habitat fragmentation, habitat destruction and habitat change. This change causes a shift in the bird's diet. Forests provide various types of wood fruits, while oil palm only provides one type of fruit. This shift causes the loss of fruit-eating birds and changes in the shift in feed / bird food. Forests provide various types of wood fruits, while oil palm only provides one type of fruit. This shift led to the disappearance of fruit-eating birds and the emergence of insect-eating, seed-eating and omnivorous birds.

This activity is classified as a large impact when compared to subsequent processes such as planting, additional land maintenance, harvesting and rejuvenation which have a moderate impact on changes in bird habitat. The stages of making oil palm plantations that have the most influence on bird species diversity are land clearing/land clearing by burning, construction of facilities and infrastructure, plant treatment (fertilizing and weeding of undergrowth), oil palm rejuvenation. Land clearing activities on plantations have a considerable impact because they change the structure and composition from heterogeneous to homogeneous in the sense that forested habitats become monoculture habitats. This activity caused the destruction of bird habitats and habitat fragmentation and the emergence of bird habitats that were completely different from before.

Plant care and treatment activities have a moderate impact because they eliminate bush habitats in a short time. This activity causes the disappearance of bird species that live in the land or bush. While rejuvenation activities cause diversity to decrease and even disappear. However, oil palm plantations also have a positive impact in terms of creating new types of bird habitats and in efforts to cultivate several bird species.

The purpose of this study was to identify bird species in the oil palm plantation area and to determine the diversity of bird species in the oil palm plantation. This research is expected to provide information about the diversity and comparison of bird species diversity in oil palm plantations.

2. RESEARCH METHODS

This research was conducted at the Nagari Salareh Aia Rubber and Oil Palm Plantation, Palembayan District, Agam Regency. The tools used in this study were Ascot 7 x 50 binoculars (binoculars), Fuji film Fine Pix A800 camera 8 mega pixels, fog nets (6 m long and 3 m wide), raffia rope, bamboo (for installing nets) fog), paint, writing instruments, field notebooks, tally sheets, stopwatches, and bird species introduction guidebooks (Mack Kinnon bird species introduction field guide for birds in Sumatra, Java, Bali and Kalimantan) were used to identification. As material for observation in this study were birds found in oil palm plantations in Nagari Salareh Aia, Palembayan Sub District, Agam District.

2.1. Primary data

Primary data is data obtained by direct observation techniques in the field using the method of using mist-nets and counting species according to a specified time (Timed Species Counts-TSCs).

2.2. Secondary Data

Secondary data is data obtained from individual documents or related agencies related to this research.

2.3. Data Retrieval Method

a. Location Survey

The location survey was carried out prior to the start of the research. This survey activity aims to:

1). Determine the area to be used as a research location

2). Determine observation points and paths

3). Knowing the general condition of the research location.

b. Determination of Observation Points and Paths

Bird data were collected using a mist-net method and timed species counts (TSCs) (Bibby et al., 2000). Observation points and paths were determined purposively. For the installation of fog nets, different points are determined at each location. Mist nets were installed at the edges and in the middle of the vegetation at the study site according to predetermined points. As for TSCs data collection, five observation paths were selected which are estimated to represent all areas in rubber and oil palm plantations. The observation path is determined by cutting the contour lines at the research location.

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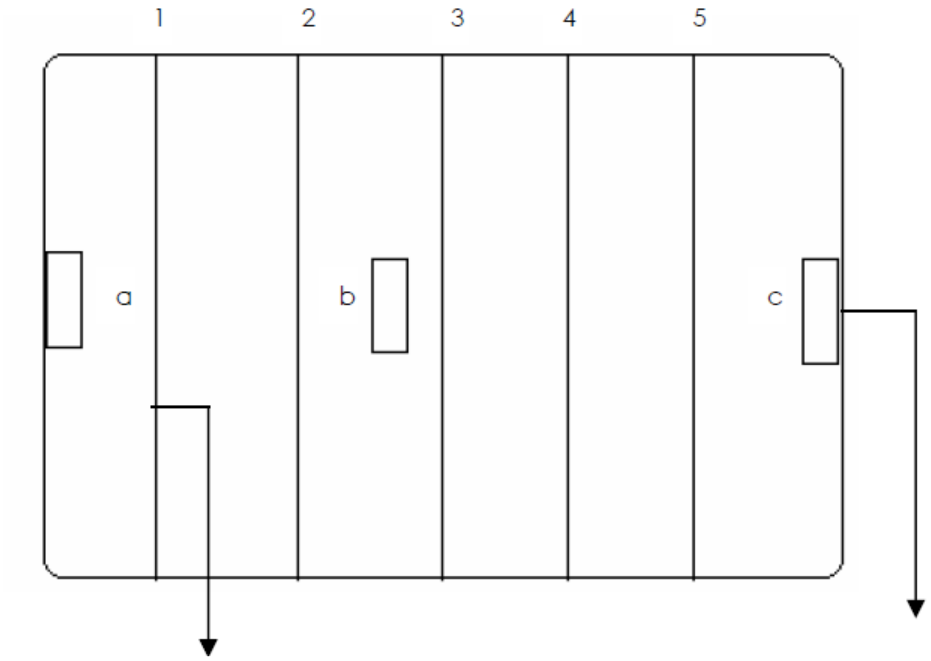

Observation Path (1,2,3,4,5) Location of Installation of Fog Mesh (a b c)

Figure 1. Sketch of Observation Line Placement and Installation of Fog Nets at the Research Location

c. How it Works

1) Use of mist nets

The use of fog nets is a way to record species by using mist nets that are installed under certain conditions (eg inside or at the edge of vegetation) and used for at least two days of fishing effort (Bibby et al., 2000). Mist nets with a height of 3 m, a length of 6 m and a mesh width of 2 cm were installed in two locations to be observed, namely in rubber and oil palm plantations. Each location has three fog nets installed. Each fog-net installed at a different point in each location. Installation of fog nets is carried out at a height of 6 meters from the ground surface in rubber plantations and oil palm plantations. The reason for installing it at a height of 6 meters is so that the fog net is right on the rubber and oil palm canopy in the research location. Installation is done twice a month, each time it is installed for 5 days. Every day the mist nets are installed from 06.00 WIB to 18.00 WIB, with inspections carried out every hour or more often if it is very hot days. But before installing the fog nets, first look at the weather conditions. If it rains or has strong winds, the fog nets are not operated. Birds that have been caught are marked with colored paint so that the species of birds that have been caught are not recorded but only recorded in number at the next arrest and identified referring to the bird species identification field guide MacKinnon et al (1998). After the bird has been identified and identified, its documentation is taken using a digital camera before being released again. The data obtained was analyzed using the diversity index (Bibby et al., 2000).

2) Timed species counts –TSCs

Observers make observations by walking slowly (approximately 1-2 km/hour) at the observed location for one hour. Data from observations are recorded in six columns, with intervals of every 10 minutes six times in one survey hour. the first minute, every species seen is recorded in the first column, only the name of the species, without the number of individuals. For the second 10 minute period, the types that have not been

recorded are written in the second column and so on until the sixth 10 minutes. Each species recorded during one hour is listed only once in the column appropriate to where the species was first seen (Bibby et al., 2000). This observation was carried out on five different observation lines at each observed location. Every day, two observation paths are observed at different times, in the morning and in the evening. On the first day, observations were made on lines one and two, on the second day on lines three and four, and so on until all lines were observed

3) Determination Stages

In this study, bird observation was carried out by direct observation. Birds that are directly observed are then identified by observing all the morphological characteristics possessed by these birds. To find out the type of bird being observed, all the characteristics possessed by the bird were immediately referred to the pictures in the book Birds in Sumatra, Java, Bali and Kalimantan (including Sabah, Sarawak and Brunei Darussalam) MacKinnon (1998). However, for unknown bird species (not included in the species introduction book), the characteristics of these birds were immediately recorded in a field notebook and sketched on a sketch sheet. Morphological characteristics that must be known are color, beak shape, head color, presence or absence of crests, whiskers, leg shape, wing color, neck and chest feather color, tail color and type and other features that might be helpful for species identification. All of these characteristics are recorded directly in the field so that no characteristics are forgotten.

4) Data Analysis

a) Diversity of Bird Species

To determine the value of bird species diversity, the Shannon Weinner Diversity index (Bibby et al., 2000) is used with the formula:

$H' = -\Sigma pi.\ln(pi)$

$$p_i = \frac{n_i}{N},$$

where, $i = 1,2,3...,S$

H' = Shannon Wienner Index

ni = number of individuals of the i-th species

N = total individuals of all species

S = number of species

The index value of bird species diversity ranged from 1.5–3.5. Values <1.5 indicate low diversity index, then values ranging from 1.5 to 3.5 indicate moderate diversity index and values > 3.5 indicate high diversity index (Rahmawati, 2006).

b) Data Analysis of Timed Species Counts (TSCs)

In analyzing the results, each species was scored according to the 10-minute period in which the first species was recorded, so that the species recorded in the first 10 minutes was given a score of six, the first species recorded in the second 10 minutes was given a score of five and so on, until the species recorded in the last 10 minutes was given a score. One. The relative abundance index recorded in repeated observations was

calculated as the mean score of each observation. Therefore the value varies between a maximum value of six and a minimum value of 1/n (where n is the number of repetitions of observations).

c) Community Similarity Index

To determine the similarity value of bird species communities, the Sorensen similarity index (Widodo, 2005) was used with the formula:

$$Ss = \frac{2C}{A + B} \times 100\%$$

Where Ss = Sorensen similarity index

A = total number of birds in location A

B = total number of birds in location B

C = number of the same species at locations A and B

3. RESULTS AND DISCUSSION

From the results of an inventory of birds in oil palm plantations, both land applications and non-land applications, there are 8 species of birds as shown in Table 1.

Table 1. Important Value Index of Birds Found in Oil Palm Plantations

Nu.	Type	RF	RD	IVI
1.	*Colocalia esculenta* (Walet Sapi)	15,00	3,75	18,75
2.	*Pycnonotus goiaver* (Merbah Cerocok)	20,00	48,75	68,75
3.	*Streptopelia chinensis* (Tekukur)	20,00	22,50	42,50
4.	*Halcyon smyrnensis* (Cekakak Jawa)	5,00	3,75	8,75
5.	*Prinia familiaris* (Prenjak Jawa)	20,00	15,00	35,00
6.	*Copsychus saularis musicus* (Murai)	10,00	3,75	13,75
7.	*Rhipidura javanica* (Kipasan Belang)	5,00	1,25	6,25
8.	*Porzana cinerea* (Tikus Alis Putih)	5,00	1,25	6,25

Table 1 shows that the most dominant bird species are Pycnonotus goiaver (Merbah Cerocok) with an IVI of 68.75 %; then Streptopelia chinensis (Tekukur) with an IVI of 42.50 % and the third is Prinia familiaris (Prenjak Java) with an IVI of 35.00 % and finally is Porzana cinerea (Rat with White Eyebrows) and Rhipidura javanica (Striped Fan) with an IVI of 6.25 %. Likewise, Pycnonotus goiaver (Merbah Cerocok) was the most common (48.75%), followed by Streptopelia chinensis (Tekukur) with an abundance of 22.5 % and the least abundant was Porzana cinerea (White Alis Rat) and Rhipidura javanica (Striped Fan) with an abundance of 1.25 %. The abundance of each species is presented in Table 2 and the Similarity Index for each bird found at a distance of 0 – 250 m, 250 – 500 m, 500 – 750 m and 750 – 1000 m from the land application location is presented in Table 3.

Pycnonotus goiaver (Merbah Cerocok), Streptopelia chinensis (Tekukur) and Prinia familiaris (Prenjak Java) are found, which are adaptive species in oil palm plantations. Turtledoves are often found on garden paths because they eat small rocks to aid their digestion. Magpie bird species (Copsychus saularis musicus) is a bird species found around 500 m from the center of the land application, and the Javanese Cekakak (Halcyon smyrnensis) is found

around 1000 m from the center of the land application. The farther from the center of land application the more bird species and the number of individuals found, the more bird species and the number of individuals found (8 species were found with 19 individuals).

Table 3. Index of Similarity of Bird Species Found at Different Distances from the Center of Land Application in Oil Palm Plantations.

Similarity Index	%
IS (0-250) - (250-500)	100
IS (0-250) - (500-750)	80
IS (0-250) - (750-1000)	80
IS (250-500) - (500-750)	66,67
IS (250-500) - (750-1000)	37,50
IS (500-750) - (750-1000)	66,67

From Table 3 above it is known that the bird species found at a distance of 0 – 250 m to 250 – 500 m are 100% the same, but 80% the same (similar) to the birds found at a distance of 750 – 1000 m. For birds found at a distance of 250 – 500 m with birds found at a distance of 750 – 1000 m there is a similarity of 37.50% (less similar); Likewise with bird species found at a distance of 500 -750 m with a distance of 750 - 1000 m there is a similarity of 66.67% (similar). So here there are different species found at different distances except up to a distance of 500 m the species of birds found are 100% the same. The types of Pycnonotus goiaver (Merbah Cerocok), Prinia familiaris (Prenjak Jawa) and Streptopelia chinensis (Tekukur) were not affected by the smell due to land application, except for the types Rhipidura javanica (Kipasan Belang) and Porzana cinerea (Tikus Alis Putih) which were only found after the above distance 500 m from the Palm Waste land application.

Efforts that must be made to minimize the effect of forest conversion on bird species diversity include the government having to decide on new regulations regarding the manufacture of sustainable plantation crops. Plantation companies must avoid clearing land by burning and provide Germplasm conservation gardens, local native forest plant nurseries to make it easier for forest rehabilitation later. It is necessary to provide land reserves to accommodate birds affected by plantations as an effort to form corridors. There is a need for crop rotation and rejuvenation rotation to provide time and place for birds to migrate during rejuvenation. There needs to be further research on the effect of fragmented habitat spacing on bird populations and diversity.

4. SUGGESTION CONCLUSION

4.1. Conclusion

a. It is possible to identify the types of birds in the oil palm plantation from those with the highest to the lowest IVI, namely Pycnonotus goiaver (Merbah Cerocok), Streptopelia chinensis (Tekukur), Prinia familiaris (Prenjak Java), Colocalia esculenta (Cow Swallow), Copsychus saularis musicus (Murai), Halcyon smyrnensis (Javanese kingfisher), Rhipidura javanica (Striped Fan) and Porzana cinerea (White Eyebrow Rat).

b. The diversity of bird species in the oil palm plantations is moderate to high because only 8 species of birds have been found

c. It is necessary to continue this research with more complete observations

4.2. Suggestion

a. Further research is needed to complete the data obtained even more by making longer observations from 5.30 when the sun starts to rise until the evening before sunset.

b. Looking for a comparison of forests that are still intact and not fragmented around oil palm plantations.

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