Forest Land Management System and Effect on The Presence Of Birds at Nusa Laut Island

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Abstract. Management of forest land by the community is generally to meet the needs of life, but on the other hand forest land also provides benefits for birds as a habitat for various activities and for the survival of these birds. This study aimed to determine how the effect of forest land management systems by the community on the existence of birds. The research approach used was field surveys and interviews with land management communities. The results showed that the Ameth community land management system was divided into land use to make gardens indicated by types of food plants (vegetables and tubers) and use to make dusung indicated by longevity plant species (nutmeg, cloves, coconut, etc.). The community found 10 identified species of birds when managing land. Then, based on the result of the study, 26 species were found in a sample location of 5 hectares. Although the birds do not get the attention of the community, there are community anticipatory actions to anticipate the occurrence of conditions and efforts to protect the garden and dusung from damage to plants by birds.

Keywords: Forest Land, Birds, Society

1. Introduction

Birds are one of the biodiversity that must be preserved from extinction and decreased species diversity. According to [1] the existence of a species of bird can be used as an indicator of biodiversity, because the group of birds has supporting characteristics, namely living in all habitats, sensitive to environmental and taxonomic changes and its spread has been known directly enough [2] Birds can be used as an environmental indicator, because if there is degradation of birds environment, the nearest natural components are affected. Birds also have an important role in the distribution of seeds.[3]

Birds have high economic value that can be used as food (meat, eggs, nests), traded and maintained by the community. According to [4], beautiful bird feathers are widely used by fashion designers to design clothing or other accessories. Another benefit that can be taken is the wallet bird's nest, which has the properties to cure several types of diseases. According to [4] many birds are traded as pets. However, due to this large amount of trading activity, several species of birds are reported to have almost disappeared, such as cucak rawa, jalak, murai batu and perkutut.
Birds are also used as a form of community culture. In the highlands of Kalimantan, the presence of birds can be used as a calendar. The agricultural land is then worked on sowing, coinciding with the arrival and passage of migratory *Kicuit Motacilla*. Furthermore, other Iban and Dayak tribes in Kalimantan use this bird species behaviour as a guide for farming. [5]. According to [6] the Dayak Laut community in South Kalimantan still believes that there are seven species of birds that are the daughter-in-law of the ruling gods. The species are one species of piculet, one species of raja udang, dua trogon, one species of jay, one species of woodpecker and one species of shama.

Because of the high value of benefits possessed by birds ([3]; [7]), these animals are very vulnerable to disturbance and hunting. [8]. States that humans are the main cause of disturbance to birds, revealed that trade in birds and their parts (meat, eggs, bones, opets and feathers) are the cause of the scarcity of a bird species. An indication of the scarcity of a bird species in nature is rare on the market, so the price is expensive. Such market conditions will trigger capture in the wild, thereby increasing the number of rare species.[9]

The people in Ameth Village have traditionally managed land in the form of gardens and *dusung* that have been used for generations to meet family needs. Land use by planting various types of plants between forest planting (woody plants) causes a garden and dusung has a variety of stratification. This is very supportive for a bird's habitat. For this reason, this study aimed to look at the relationship between the presence of birds and the management of forest land managed by the community.[2]

2. Methodology
The research location is in the State of Ameth - Nusa Laut Island, Moluccas, the position of the study site is presented in Figure 1.

![Figure 1. Location of bird species diversity research in the Ameth State of Nusa Laut Island (Source: BPKH Region IX Ambon 2007).](image)

The research data plot used is rectangular in shape. [3] the area of the data plot at the study site is 50,000 m² (5 ha). The research plot design is presented in Figure 2. The bird data collection was divided into two times observation time, namely; in the morning between 07:30 - 10:00 and the afternoon between 16:00 - 18:30.
Diversity Index was intended to see the relative abundance of bird species with their communities, the Diversity index used was; Richness index \((R_1)\), Diversity index \((H')\) and Evenness index \((E)\). Richness Index was the total number of species in a community, the number depends on the sample size of the area and the time required to achieve it. The sample size and time referred to were already explained in the data collection method above. Richness index \((R_1)\), used the Margalef equation [3]

![Data plot design and transect direction for bird data collection](image)

**Figure 2.** Data plot design and transect direction for bird data collection

Community data collection techniques were done by semi-structured interviews. The respondents interviewed were determined purposively with the consideration that the respondents owned management land and or had activities to take birds or who have a hobby of caring for birds. Interviews were also conducted with key informants that included community leaders in the village.

3. Result and Discussion

The use of land by the Ameth community is more for the management of gardens and *dusung*. Garden is a category of land use for planting short life plants (food crops) while *dusung* is categorized as land use for growing long life plants such as nutmeg, coconut etc. All of the land in Ameth has been divided into clan lands and only the land that has been planted by the family is inherited, so that it is no longer able to open new land. The community has a very high frequency to garden compared to *dusung*. It is intended to make smoke in the garden to avoid pests or birds that interfere garden plants. This is very effective compared to making snares. The average area of plantations owned by the community is 0.25-0.5 ha, while the area of *dusung* is 1-1.5 ha. The location of the garden and the *dusung* are usually not in one place but separated, because there is no large area. Ameth is mostly mountainous, hilly and rocky. There is a family that has 12 dusung locations. [10]. The species of birds that were often encountered by the community when in the garden / *dusung* include Maleo, Cui (Chili), Raja prawn, Pombo, Eagle, Tekukur, Arika (Mandar), Sparrow, and Kostor Bird (*Tuwur Bird*). Even, one species was termed the Bird of Tukang (construction laborers) because it usually sounds like a saw and knock on a hammer at night. This
shows that the community still has attention to the presence of birds around them. Afrika Birds (*Mandar Birds*) and Maleo often eat cassava plants in the soil, taken by digging the soil. Types of plants digged include cassava, taro and *petatas*. Bananas are often eaten by bats. There was no attack on the *dusung* plant, only a nest was made but not on the fruit tree. Some species of birds that according to the community can be a sign of an event will occur, for example Rain Bird. If there are many flying Rain Birds, there will be heavy rain. Then, if Kostor birds shout at night, it means that someone will die in the village.[11] Meanwhile, if the bird is screaming in the ocean there must be a trading person who died. Furthermore, the afternoon bird screaming is the sign that the time is almost morning. Based on this, the bird community also plays an important role in helping the community in anticipating a condition.[12]

The Red Kasturi bird is very rare encountered. In ancient times, 8-10 of these birds could be found in Tamarind tree, but there are no more of them today. Besides that, there is also Pombo Putih, which has now been reduced. The community assumed that the bird was only as a visitor, not to live there. [13] According to the community, several species of birds have the potential to be hunted and traded. However, on the other hand, birds can be used as a tourism potential for those who have a hobby of birds. Some communities in the village of Ameth keep birds as hobbies but most birds that are jailed come from outside such as parrots and Red Parrots. Utilization of bird species for household consumption, mostly in Pombo and Maleo and Arika bird species. The birds were obtained by making snares in the garden area. [1]. Disturbances in bird populations can include disturbance of bird habitat and disturbance of individual bird species. The biggest disturbance of bird habitat was the conversion of vegetated land into non-vegetated land or into cultivated land that has an impact on bird survival. [3] said that the presence of bird species in a habitat is related to habitat conditions, bird species and the amount of the disturbance in that place. The habitat conditions are the availability of food, rest, shelter, sleep and nesting. If a bird species cannot adapt to habitat change, the bird will move and its population will decrease. There were 26 bird species found in the total area of the observation area of 5 ha. There are 4 species of birds that were recorded to have quite a number of individuals namely; Perling Maluku with 32 individuals, 29 Walet Sapi, 25 Madu Sriganti birds and 23 Cabai Kelabu. Furthermore, there were 11 species recorded with a very small number of individuals between 1 to 4 individuals. There was no species that looks very dominant and was recorded with a striking number of individuals.

The number of species found in 5 data transects was quite varied between 13 to 18 species (Figure 3). The encounter of species showed a clearer variation pattern between encounters of species in the morning and afternoon. In the morning, the number of species found was slightly more between 7-16 species, while in the afternoon between 7-11 species. This condition showed that the movement of bird species in the study site was more in the morning than in the afternoon, or in other words, the birds move spreadly more in the morning than in the afternoon. The number of contacts and the number of individual species between observations in the morning and afternoon shows that; the number of contacts with bird species in the morning was 75 times slightly higher than the number of contacts in the afternoon, which was 71 times. The number of individuals gave a stronger description where the number of individuals found in the morning is 140, which was higher than the number of individuals found in the afternoon, which was only 119.
Figure 3. Number of bird species found in each data transect

Total Number of Individuals of all species in each data transect shows that Transect 1 has a total number of individuals that is more than 4 other transects that reach 60 individuals. There are 3 species of birds recorded with a significant number of individuals between 10-15 tails namely; Walet Sapi, Perling Maluku and Madu Sriganti birds. This condition is also caused by large and lush trees with a good enough distance to provide space for the movement of birds. In addition, the old garden land that has been shaped dusung with large and productive fruit trees that provide a place of rest and shelter for the species of birds that pass and of course the source of feed needed [14]. The birds found at the study site were more known and recorded from the results of observations of hearing the sound as many as 75 times, while those who were known from seeing directly were fewer in number namely 71 times. Diversity Index per data transect shows the value of medium Diversity Index between 2.196159 to 2.635791 This condition is confirmed by the diversity value of the overall data transect that shows the value of medium Diversity Index, which is 2.854956. The evenness index value is high between 0.832176 and 0.944853. This evenness index value certainly leads to a good category. The value of the evenness index of the entire transect shows that the resulting Evenness Index value is high which is 0.876265. This shows that the species of birds in the study site spread quite well and fairly evenly.

The Dominance Index shows that there are 2 species of dominant birds overall, namely Perling Maluku with IDJ value of 12.4% and Walet Sapi with IDJ value of 11.2 %. Then, there are 6 species that are subdominant and 18 other species of birds fall into the category of species that are not dominant. Abundance Classes based on Total Number of Individual species shows that most species of birds are in the rare class and uncommon that reaches 16 species of birds. This is because the number of individual species of birds found in the field is mostly between 1 and 9 birds. There are only 2 species of birds which are common abundance, namely; Perling Maluku and Walet Sapi. They are recorded with a number of individual species that is quite a lot between 29 to 32 tails. However, for each data transect; the number of bird species that belong to the rare abundance class is also dominant between 11 to 14 species.

The results of the calculation of the Species Similarity Index value of birds showed that the comparison of the Species Similarity Index between the data transects did not achieve identical species similarity. However, the comparison of these values has reached the species similarity which is quite real because it has exceeded 0.50, namely; between 0.6053 to 0.7241. this condition shows that the species in
the study area are spread fairly evenly and this is in accordance with studies produced by the evenness index. Total Population Density per transect shows that there are 5 species of birds that have Abundant Population Density of between 51 - 65 animals / 5 ha. Then, there are 4 species that have quite abundant population density of between 26 - 31 individual / 5 ha. Furthermore, there are 2 species that have quite significant population density of between 18-20 individual / 5 ha. Next, there are 7 species that have few population density of between 5-9 individual / 5 ha. Meanwhile, 8 species have a very few population density of 1- 4 / 5 ha. Forest management by the Ameth community in the form of gardens and dusung is based on local knowledge that develops in the community and generally uses traditional equipment. The limited ability to clear land with a mixed crop system does not significantly affect the structure of forest vegetation, so that there is sustainability in land use. [15]. Birds that use forest land that have been managed by the community are quite high but the community does not have the knowledge for the existence of these birds. Around 40% of bird species are known to the public, but only limited to common species that serve as markers of certain situations. Besides, birds that are of major concern are birds that damage garden planting. This was anticipated by conducting intensive cleaning and burning activities to keep the birds away, in addition to installing snares for later consumption by the community. Sustainability of birds is not a concern of the community because people rarely consume birds. The fulfillment of protein is obtained from sea fish. However, based on the results of community observation, some species of birds are rare and some are not seen anymore. This shows that the diversity of birds that have other benefits besides consumption will be lost. This situation will affect the presence of birds if it is not anticipated. [16]

4. Conclusion

The presence of birds on community-managed forest land has a beneficial and destructive impact relationship. However, the presence of bird species known by the public is quite high (40%) compared to the results of studies of the bird species found. The diversity of bird species is quite high but there is no significant species dominance. Therefore, the existence of birds can be used as a category of importance of birds in the Ameth village to be conserved. Suggestions that can be made based on this research is the need for bird preservation because it has an impact on the environment. For this reason, socialization about the importance of birds in an area is needed.

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