In-situ kuskus conservation strategy in Wakasihu Village, West Leihitu District, Central Maluku District

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Abstract. Kuskus, a marsupial species belonging to the Phalangeridae family that is vulnerable in the IUCN Redlist, is one of the endemic animals whose survival is currently very concerning due to habitat destruction and poaching, so conservation activities need to be carried out immediately. This study aims to identify the characteristics of the habitat, type of feed, and in situ conservation strategies in the Wakasihu forest, Leihitu Barat sub-district, Central Maluku district. This research was conducted in October 2020. Habitat characteristics were identified using vegetation analysis, forage types were identified using direct and indirect observations, and in situ conservation strategies using SWOT analysis. The highest index of importance at the tree level in the line of observation is the type of gayam (Inocarpus fagifer) (20.9%), at the level of weaning is the langsat species (70.32%) the level of the pole type of brown (69.27%). The diversity level of plant species is high and the level of evenness of plant species is even. There are 24 types of plants recorded as potential for special feed. In the in-situ conservation strategy that is carried out is planting the type of feed preferred by the specialists, so as to provide a stable feed availability during the successive fruiting period. Apart from that, the restriction of hunting for specialities is through written regulations and the imposition of sanctions.

1. Introduction

Wakasihu Village, which is located in the coastal area of Ambon city, West Leihitu sub-district, Central Maluku district, is a representative of the tropical rainforest ecosystem and is the habitat for one of the endemic animals, namely Kuskus (Phalanger sp). The Kuskus, which is a member of the Phalangeridae family, is a type of marsupial mammal which distribution in the Maluku region. Kuskus is one of the endemic species of Maluku which is protected based on Kuskus in Indonesia which has been protected since 1990 through the Wild Animal Hunting Regulation (PPBL) No. 226/1931, Law no. 5/1990 concerning the conservation of living natural resources and their ecosystems, and Law no. 7/1999 on the preservation of plant and animal species [1-3].

Kuskus is in the vulnerable status on the IUCN Red List because currently, its population has decreased due to deforestation and illegal hunting. Kuskus is a type of mammal that is nocturnal (active at night), and has a very slow movement so that it can be a threat to the existence of Kuskus because it is easily caught by humans. One of the important factors that must be considered in ensuring the survival and management of specialities is the availability of information about the types
of feed consumed by these animals. The function of food is as a constituent of the body, an energy source, and a regulator of metabolic processes [4,5].

Information related to Kuskus feed carried out in previous studies showed that around 31 plant species were identified as sources of Kuskus 'food in the Tangkoko Nature Reserve, North Sulawesi [6], 10 species of Kuskus' food in the Tangkoko Batu Nature Reserve, Angus, North Sulawesi [7], 4 types of food sources for bear Kuskus in the Educational Forest of Hasanuddin University, South Sulawesi [8], and 44 types of food sources in Manusela National Park [9].

The loss of Kuskus habitat due to changes in land use into small-scale community agricultural areas, cutting down of feed sources for housing wood and household furniture, and rampant illegal hunting are the main threats to the survival of cuscu[5]. For this reason, it is necessary to make in-situ conservation efforts in supporting the preservation of the specialities in their habitat. Supporting the conservation of Kuskus in situ, one of the important factors that must be considered in ensuring the survival and management of wild animals is the availability of information about the types of feed consumed by these animals. For this reason, the purpose of this study is to determine the condition of the Kuskus' feed source in Wakasihu Village, and the form of in-situ conservation strategies to support the preservation of this type of marsupial.

2. Methods
The research was conducted in Wakasihu forest, West Leihitu District, Central Maluku Regency. The research was conducted in October - November 2020. The tools used were binoculars, measuring tape, tape measure, raffia rope, stakes, compasses, cameras, GPS, area maps, plant species identification manuals, tally sheets, and stationery. The materials used were questionnaires and vegetation in the research location.

Data collection is generally carried out using direct observation methods. The data collected were the types of feed consumed in utilizing feed, as well as the potential types of feed (density, dominance and frequency) in the study area. There are three ways of collecting data in observing the types and potential of Kuskus feed. 1) Collecting data on the types of food eaten, is carried out by direct observation methods concerning the species of feed eaten by Kuskus. 2) Data collection of preferred feed frequency is carried out by observing the types and parts of plants eaten during observation of feeding activities. 3) Collecting data on the ecological status of the type of feed in the movement area. Observation of the type of Kuskus' feed, was carried out by recording the type of plant selected to be eaten and recording the part of the plant consumed (leaves, fruit, flowers and branch bark) using the scan sample method. The data collection methods are presented in Table 1.

| No | Type of Data       | Data Collected                                                                 | Data Collection Methods                                      |
|----|--------------------|-------------------------------------------------------------------------------|-------------------------------------------------------------|
| 1  | Habitat Characteristic | • Altitude  
  • Temperate and humidity  
  • Source of Water  
  • Composition and structure of Vegetation | • Measurement by GPS  
  • Measurement by termometer dry-wet  
  • Measurement by GPS  
  • Vegetation Analysis( Line plot method) |
| 2  | Food Potential     | • Type of food  
  • Parts eaten | • Direct and indirect observation (discovery of feed traces), interviews |
| 3  | Conservation Strategy | • EFAS  
  • IFAS | Indepth interview |

Vegetation analysis was carried out to determine the composition and structure of the habitat of bear Kuskus. The method used is the checkered line method [10]. Plots are created based on the location of the discovery of Kuskus and the location of the discovery of traces of eating bear Kuskus. The stages of the vegetation analysis are carried out by:
- The encounter with Kuskus and the discovery of traces of eating bear Kuskus.

- Making a checkered line, with a total of 3 plots at each location where bear Kuskus encounters and the location where Kuskus' food is found. The distance between the plots is 10 meters.

- Collecting data in plots in the form of plant levels in it, namely seedlings, saplings, poles and trees.

The line plot method design is shown in Figure 1.

![Figure 1. Line plot method](image)

The vegetation plots made were 10 plots, with 3 plots each at 3 points where the Kuskus was encountered and 5 points where Kuskus' food was found. Data were collected in plots measuring (20 m × 20 m) for the tree level, with each sub-plot (10 m × 10 m) for the pile level, (5 m × 5 m) for the sapling level, and (2 m × 2 m) for the tree level, seedling level. Identification of plant species was carried out using the Tree Types book, compiled by Regional Name and Botanical Name Book 10.

Identification of the types of Kuskus' food was carried out by direct and indirect observation (finding food traces), as well as conducting interviews with redundant to determine the types of plants that could potentially serve as Kuskus' food. The data collected included plant species and plant parts eaten by Kuskus. The line of observation was determined based on the results of a field survey, namely the location which was thought to be the location of the meeting of the Kuskus and was thought to represent the availability of the habitat function as a place to eat, shelter, and rest the Kuskus. The sample plots were made in size (20 m × 20 m) at the location where Kuskus was found.

The data from the analysis of vegetation in the field have calculated the values of density, relative density, frequency, relative frequency, dominance, relative dominance, and index of the importance of a plant species. In addition, the Shannon-Wiener species diversity index and the evenness index of a plant were calculated. The important value index according to has the following equation [11]:

\[
\text{Density} = \frac{\text{number of individuals of each species}}{\text{area}}
\]

\[
\text{Relative Density} = \frac{\text{Density of Species}}{\text{Density of All Species}} \times 100\%
\]

\[
\text{Dominance} = \frac{\text{the total area of the base area of a type}}{\text{area}}
\]

\[
\text{Relative dominance} = \frac{\text{dominance of a species}}{\text{dominance of all species}} \times 100\%
\]

\[
\text{Frequency} = \frac{\text{Number of plots found in species}}{\text{(total number of plots)}}
\]

\[
\text{Relative frequency} = \frac{\text{frequency of a species}}{\text{frequency of all species}} \times 100\%
\]

\[
\text{Importance Value Index} = \text{KR} + \text{FR} + \text{DR} \quad \text{(Trees and poles)}
\]

\[
\text{Importance Value Index} = \text{KR} + \text{FR} \quad \text{(Seedlings and saplings)}
\]

Shannon-Wiener species diversity index with the formula:

\[
H' = -\sum_{i=1}^{n} p_i \ln p_i = \frac{1}{N}
\]

Information:

\[
H' = \text{Shannon-Wiener diversity index}
\]

\[
i = \text{number of individuals or the importance of type } i
\]

\[
N = \text{total of individuals or the importance of all species}
\]

Evenness index: \( E' = H'/\ln (S) \)

Information:

\[
E' = \text{evenness index}
\]

\[
H' = \text{Species diversity index}
\]

\[
S = \text{Number of species}
\]

The observation data of bear Kuskus' feed in the field were made a table in the form of plant species eaten by bear Kuskus, and a graph was made of the part of the plant eaten by Kuskus. The results were analyzed by descriptively qualitatively. Data from observations of daily activity of bear Kuskus in the
field are in the form of daily activity duration of bear Kuskus that appears during observation and each activity recorded is calculated as a value.

3. Results and discussion

3.1. Habitat characteristics kuskus

3.1.1. Physical components

Research conditions when collecting data in October 2020 in the rainy season conditions. The average temperature during the study ranged from 25°C-28.5°C an air humidity of 86%-92%. During data collection, rain rarely occurs, but when it rains the rainfall is very heavy but with a short duration. The research was conducted at an altitude of 8-10 m above sea level in lowland rain forests. According to [12], Kuskus can live up to an altitude of 600 m above sea level. Based on the results of the observations, there was no direct use of water by Kuskus at the observation location. This is because Kuskus is a nocturnal and arboreal animal that rarely descends to the surface of the soil, besides that Kuskus gets a source of water from the contents of the shoots and young leaves on the tree which is used as a tree for feed, nest, and play.

3.1.2. Biotic components

The vegetation composition and structure of the Kuskus' habitat were obtained from the results of vegetation analysis while in the field. There are 5 measuring squares on the left lane and 5 measuring squares on the right lane. Plant species that dominate other species are seen from the results of the Importance Value Index (IVI), this index serves to describe the ecological position of a species in a community [10]. The highest vegetation importance value index (IVI) at the tree, weaning, sapling and seedling levels in the left and right lanes is presented in Table 2, 3, and 4.

| No | Species (local name) | INP  | Scientific Name     | Family   | English name |
|----|----------------------|------|---------------------|----------|--------------|
| 1  | Durian               | 96.621| *Durio zibethinus*  | Bombacaceae | Durian       |
| 2  | Langsa               | 21.284| *Lansium parasiticum* | Meliaceae | Duku var. aqua |
| 3  | Pala                 | 19.414| *Myristica fragans* | Myristicaceae | Nutmeg       |

| No | Species (local name) | INP  | Scientific Name     | Family   | English name |
|----|----------------------|------|---------------------|----------|--------------|
| 1  | Cokelat              | 69.278| *Theobroma cacao*   | Sterculiaceae | Cocoa       |
| 2  | Duku                 | 58.687| *Lansium domesticum* | Meliaceae | Duku         |
| 3  | Langsa               | 58.354| *Lansium parasiticum* | Meliaceae | Duku var. aqua |
| 4  | Pala                 | 16.101| *Myristica fragans* | Myristicaceae | Nutmeg       |

| No | Jenis (local name) | INP  | Scientific Name     | Famili   | English Name |
|----|--------------------|------|---------------------|----------|--------------|
| 1  | Gayam              | 20.1872| *Inocarpus fagifer* | Fabaceae | Gayam        |
| 2  | Kopi               | 17.2460| *Coffea spp* | Rubiaceae | Coffe plant  |
| 3  | Langsa             | 17.2460| *Lansium parasiticum* | Meliaceae | Duku var.aqua |
Based on the results in Table 2, the highest vegetation significance index (IVI) in the observation path at the tree level is durian (*Durio zibethinus*) (96.62%), duku var. aqua (*Lansium parasiticum*) (21.28%), and nutmeg (*Myristica fragans*) (19.41%). This shows that these species dominate and are important species and are used by Kuskus as a source of food, shelter and rest areas.

### 3.1.3. Components of Kuskus' feed in the Wakasihu Village area

The results of observations and interviews with communities around the Wakasiu forest area show that there are 24 (twenty four) types of vegetation used as food for Kuskus which includes forest vegetation types and agricultural and plantation plants. The parts of plants that are preferred and function as Kuskus' feed are young plants. This result is also supported in the research results of [1], [9], which state that in general, consumers prefer the type of feed that is still young, has a fresh aroma and has a sour taste. The selection of this type of feed must of course be adapted to the condition of the Kuskus' organs which are classified as small mammals. This is supported by the results of the study by [13], that the choice of feed type in marsupials is related to the morphological and histological structures of the gastrointestinal tract.

Of the 24 types of feed found in the study location, 16 types of young leaves were eaten (67%), 20 types of fruit (83%), 6 types of flowers (25%). The choice of feed type in Kuskus is related to the morphological and histological structure of the gastrointestinal tract. This is the reason for preferring young plant organs as a source of food.

| No | Type (local name) | Scientific name | Family | English Name |
|----|------------------|-----------------|--------|--------------|
| 1  | Cengkeh          | *Syzygium aromaticum* | Myrtaceae | Clove       |
| 2  | Coklat           | *Theobroma cacao* | Sterculiaceae | Cocoa      |
| 3  | Duku             | *Lansium domesticum* | Meliaceae | Duku        |
| 4  | Gandaria         | *Bouea macrophylla* | Anacardiaceae | Gandaria   |
| 5  | Ganesu           | *Gnetum gnemon* | Gnetaceae | Gnetum      |
| 6  | Gayam            | *Inocarpus fagifer* | Fabaceae | Gayam       |
| 7  | Gondal           | *Ficus septica* | Moraceae |            |
| 8  | Guawas           | *Psidium guajava* | Myrtaceae | Guava       |
| 9  | Jambu Hutan      | *Eugenia spp* | Myrtaceae |            |
| 10 | Ketapang Hutan   | *Terminalia copelandii* | Combretaceae | Ketapang |
| 11 | Kayu Burung      | *Eleocarpus ganitrus* | Eleocarpaceae | Rudraksa/Ceylon |
| 12 | Kayu Samar       |                 |         | Olive       |
| 13 | Kemiri           | *Aleurites moluccana* | Euphorbiaceae | Candelnut |
| 14 | Kenari           | *Canarium amboinensis* | Burseraceae | Canary/Walnut |
| 15 | Kopi             | *Coffee spp* | Rubiaceae | Coffe plant |
| 16 | Langsa           | *Lansium parasiticum* | Meliaceae | Duku var.aqua |
| 17 | Lenggua          | *Pterocarpus indicus* | Fabaceae | Red Sandalwood |
| 18 | Linat            |                 |         | Amboyna     |
| 19 | Mangga           | *Mangifera indica* | Anacardiaceae | Manggo     |
| 20 | Matoa            | *Pometia pinnata* | Sapindaceae | Fijian Longan |
| 21 | Pala             | *Myristica fragans* | Myristicaceae | Nutmeg     |
| 22 | Rambutan         | *Nephelium lappaceum* | Sapindaceae | Rambutan   |
| 23 | Sirippar         | *Ficus spp* | Moraceae |            |
| 24 | Tomi-Tomi        | *Flacourtia inermis* | Salicaceae | batoko plum |

*Source: Primary data, 2020*

[14] states that in the Table Mountain Tourism Park there are 26 types of plants used as food for Kuskus. The high potential of vegetation types found in this area provides opportunities for the production of Kuskus' feed ingredients. The types of vegetation consumed by Kuskus in the forest area of Wakasiu Village are presented in Table 6. The comparison of the types of feed consumed by the two types of Kuskus shows that they both consume the same plant species but based on their home...
range, P. orientalis and S. maculatus are often found in addition to forests are also in plantation or agricultural areas, because of the solitary nature of large populations [15,16]. The types of feed consumed include forest vegetation, agricultural or plantation crops. The parts consumed by Kuskus are fruit (ripe), young leaves (shoots /shoots) and flowers. The same opinion was expressed in the research results of [8,9], which state that the vegetation parts of the preferred feed are fruit, shoot, and flowers which have a sour aroma and taste. The same opinion was expressed in [17] which stated that apart from fruit, young leaf shoots were also consumed. Perhaps this is due to the fact that when the plant has not produced fruit, the young shoots are consumed. This phenomenon is natural, because [18] explains that when the preferred food is not available, wild animals usually shift their consumption to alternative feed or "emergency foods". Based on the results in Table 2, the highest vegetation importance index in the line of observation at the tree level is durian (Durio zibethinus) (96.62%), langsat (Lansium parasiticum) (21.28%), and nutmeg (Myristica fragans) (19.41%). This shows that these species dominate and are important species and are used by Kuskus as a source of food, shelter and rest areas. However, the density value shows the opposite result.

3.1.4. Alternative Kuskus conservation strategy

In managing the habitat of Kuskus, it is necessary to formulate a strategy based on the carrying capacity of the habitat. SWOT analysis (Strength, Weakness, Opportunity, Threat) is one of the analysis methods used to get the best strategy by measuring the strengths, weaknesses in the existing sector and simultaneously measuring the opportunities and challenges /threats that will be faced later after determining the strengths, weaknesses, opportunities, threats, and challenges in every sector. The method of determining the internal and external strategic factors is as follows: 1. In the Strength (S) box, identify some of the strengths that exist in the Wakasiu Village forest area in achieving Kuskus preservation; 2. In the Weakness box (W), identify several existing weaknesses, namely weaknesses in achieving success in Kuskus conservation. 3. In the Opportunity (O) box, identify some external opportunities that will be obtained in efforts to preserve Kuskus. 4. In the Threat (T) box, identify some of the challenges that will be faced in efforts to manage Kuskus, inbox 5. Identify strategic possibilities of conservation and management of Kuskus based on the consideration of a combination of four strategic factors, namely SO, ST, WO, and WT strategies.

The identification of each factor was obtained from the results of direct observation in the field, the results of interviews with key actors of Raja Wakasiu, Saniri Negeri, and the community around the area, as well as a literature study on activity reports at the Maluku BKSDA. Based on the carrying capacity of the habitat in the form of altitude-related to the behaviour and movement of Kuskus which is relatively easy at medium altitude, location slope, water availability, area boundaries in the form of natural boundaries in the form of rivers, the condition of the community around the area, availability of food can be used as an internal factor divided into strength factors and weakness factors.

Weaknesses can be seen from the current condition that has not been developed and is a factor causing damage to the habitat of Kuskus, so it does not support in-situ conservation efforts in habitat locations. This can be identified from the physical condition of the habitat that is not supportive, the condition of human resources and management documents. External factors in the form of threats and opportunities, threats can be seen from the disturbance of the area in the form of hunting and logging, the ease of access to the area which is supported by roads so that community activities around the area are high, including hunting. The opportunity factor is an external condition outside the existing or non-existing areas so that it can be developed as a supporting factor for Kuskus conservation. The opportunities that already exist are laws and regulations that state Kuskus as protected animals, cooperation with stakeholders who focus on the preservation of Kuskus. Meanwhile, the opportunity that does not exist at this time is the development of ecotourism in the form of observing the behaviour of Kuskuses as unique and protected marsupials.

a. Identification of IFAS (Internal Strategic Factors Analysis Summary) and EFAS (External Strategic Factors Analysis Summary)

After identifying each of the internal and external factors above, to formulate a strategy for Kuskus conservation, an analysis of each of these factors was carried out through scanning between IFAS and
EFAS. The stages of the analysis using SWOT, giving weight to each element of the internal and external factors, are the key to the success of strategy making (key success factor). The weighting is given based on the relative advantage of a factor. The weight value in this study is the result of observation and in-depth interviews with resource persons. Give a weighted value for each factor ranging from 1.0 (very important) to 0.0 (not important). The key success factors are then given a rating indicating the value of support for each factor in achieving the goal. The granting of a rating starts with number 4 (very influential) to number 1 (very weak).

**Table 6. Identification of internal factors (strengths and threats)**

| No. | Strength | Weakness |
|-----|----------|----------|
| 1   | The amount of food availability is large and varied | Season affects the availability of feed Kuskus |
| 2   | Flat slopes so that the proper use factor is quite high | Forage, playing and sleeping trees become trees that are often cut down to meet community household needs |
| 3   | Temperature and humidity suitable for Kuskus’ habitat | Low understanding of the community about the role and function of Kuskus for the environment |
| 4   | Clear area boundaries in the form of a river | Kuskus meat is often a need for animal protein for the community so it is often hunted |
| 5   | Shade conditions of vegetation that meet the life requirements for Kuskus as cover, play and sleep. | The low level of community knowledge in supporting reforestation in Wakasiu Village in supporting the availability of food sources for Kuskus’ trees |

**Table 7. Identification of external factors (opportunities and threats)**

| No. | Opportunity | Threats |
|-----|-------------|---------|
| 1   | Laws and regulations that define Kuskuses as protected animals | High hunting of Kuskus |
| 2   | The high level of community participation in supporting the conservation of Kuskus’ habitat in the forest | Easy access to Kuskus habitat in Wakasiu village |
| 3   | There are regulations in the village regarding animals that are allowed to be eaten and which cannot be eaten | Having a high economic value as animal protein |
| 4   | Has attractiveness as an object of ecotourism (unique and rare animals) | There is no written prohibition on hunting Kuskus |
| 5   | The population can still support captive activities | Low monitoring of the Kuskus population |

**Sources:** Primary data, 2020

c. Identification of IFAS (Internal Strategic Factors Analysis Summary) and EFAS (External Strategic Factors Analysis Summary).

After identifying each of the internal and external factors above, to formulate a conservation strategy for Kuskus in Wakasiu village, an analysis of each of these factors was carried out through scanning between IFAS and EFAS. The stages of the analysis using SWOT, giving weight to each
element of the internal and external factors, are the key to the success of strategy making (key success factor). Weights are given between 0-1, where the number 0 indicates unimportance and the number 1 indicates the most important. The key success factors are then given a rating indicating the value of support for each factor in achieving the goal. The value is between 1-5, where, 1 = very little, 2 = little effect, 3 = moderate effect, 4 = influential, and 5 = very influential.

d. Weighting for IFAS and EFAS

| No. | Strength | Strategies Factor | Quality |
|-----|----------|-------------------|---------|
| 1   |          | The amount of food availability is large and varied | √       |
| 2   |          | Flat slopes so that the proper use factor is quite high | √       |
| 3   |          | Temperature and humidity suitable for Kuskus’ habitat | √       |
| 4   |          | Clear area boundaries in the form of a river | √       |
| 5   |          | Shade conditions of vegetation that meet the life requirements for Kuskus as cover, play and sleep. | √       |

Sources: Primary data, 2020

| No. | Weakness | Strategies Factor | Quality |
|-----|----------|-------------------|---------|
| 1   |          | Season affects the availability of feed Kuskus | √       |
| 2   |          | Forage, playing and sleeping trees become trees that are often cut down to meet community household needs | √       |
| 3   |          | Low understanding of the community about the role and function of Kuskus for the environment | √       |
| 4   |          | Kuskus meat is often a need for animal protein for the community so it is often hunted | √       |
| 5   |          | The low level of community knowledge in supporting reforestation in Wakasiu Village in supporting the availability of food sources for Kuskus’ trees | √       |

Sources: Primary data, 2020

| No. | Opportunity | Strategies Factor | Quality |
|-----|-------------|-------------------|---------|
| 1   |             | Laws and regulations that define Kuskuses as protected animals | √       |
| 2   |             | The high level of community participation in supporting the conservation of Kuskus’ habitat in the forest | √       |
| 3   |             | There are regulations in the village regarding animals that are allowed to be eaten and which cannot be eaten | √       |
| 4   |             | Has attractiveness as an object of ecotourism | √       |
(unique and rare animals)

5 The population can still support captive activities

Source: Primary data, 2020

| Table 11. Weighting for threats |
|--------------------------------|
| No. | Threats                              | Strategies Factor | Quality |
|-----|--------------------------------------|-------------------|---------|
| 1   | High hunting of Kuskus               |                    | ✓       |
| 2   | Easy access to Kuskus habitat in Wakasiu village |            | ✓       |
| 3   | Having a high economic value as animal protein |                | ✓       |
| 4   | There is no written prohibition on hunting Kuskus |            | ✓       |
| 5   | Low monitoring of the Kuskus population |                  | ✓       |

Source: Primary data, 2020

| Table 12. Ranking for strength |
|--------------------------------|
| No. | Strength                         | Strategies Factor | Rating |
|-----|----------------------------------|-------------------|--------|
| 1   | The amount of food availability is large and varied |                    | ✓      |
| 2   | Flat slopes so that the proper use factor is quite high |              | ✓      |
| 3   | Temperature and humidity suitable for Kuskus' habitat |                | ✓      |
| 4   | Clear area boundaries in the form of a river |                  | ✓      |
| 5   | Shade conditions of vegetation that meet the life requirements for Kuskus as cover, play and sleep. |            | ✓      |

Source: Primary data, 2020

| Table 13. Ranking for weakness |
|--------------------------------|
| No. | Weakness                           | Strategies Factor | Rating |
|-----|-----------------------------------|-------------------|--------|
| 1   | Season affects the availability of feed Kuskus |             | ✓      |
| 2   | Forage, playing and sleeping trees become trees that are often cut down to meet community household needs |            | ✓      |
| 3   | Low understanding of the community about the role and function of Kuskus for the environment |                | ✓      |
| 4   | Kuskus meat is often a need for animal protein for the community so it is often hunted |              | ✓      |
| 5   | The low level of community knowledge in supporting reforestation in Wakasiu Village in supporting the availability of food sources for Kuskus' trees |            | ✓      |

Source: Primary data, 2020
Table 14. Ranking for opportunity

| No. Opportunity | Strategies Factor | Rating |
|-----------------|-------------------|--------|
| 1               | Laws and regulations that define Kuskuses as protected animals | √      |
| 2               | The high level of community participation in supporting the conservation of Kuskus' habitat in the forest | √      |
| 3               | There are regulations in the village regarding animals that are allowed to be eaten and which cannot be eaten | √      |
| 4               | Has attractiveness as an object of ecotourism (unique and rare animals) | √      |
| 5               | The population can still support captive activities | √      |

Source: Primary data, 2020

Table 15. Ranking for threats

| No. Threats | Strategies Factor | Rating |
|-------------|-------------------|--------|
| 1           | High hunting of Kuskus | √      |
| 2           | Easy access to Kuskus habitat in Wakasiu village | √      |
| 3           | Having a high economic value as animal protein | √      |
| 4           | There is no written prohibition on hunting Kuskus | √      |
| 5           | Low monitoring of the Kuskus population | √      |

Source: Primary data, 2020

After determining the weight and rating of internal and external factors, the next stage of analysis in identifying the in-situ conservation strategy is to determine the value of importance, which previously determined the total score of each internal and external factor in Tables 17 and 18.

Table 16. Internal strategies

| No | Strategies Factor | Quality | Rating | Influence Value |
|----|-------------------|---------|--------|-----------------|
| 1  | The amount of food availability is large and varied | 0,3     | 5       | 1,5             |
| 2  | Flat slopes so that the proper use factor is quite high | 0,2     | 4       | 0,8             |
| 3  | Temperature and humidity suitable for Kuskus' habitat | 0,2     | 4       | 0,8             |
| 4  | Clear area boundaries in the form of a river | 0,1     | 3       | 0,3             |
| 5  | Shade conditions of vegetation that meet the life requirements for Kuskus as cover, play and sleep | 0,2     | 4       | 0,8             |

Strength

Weakness
Season affects the availability of feed Kuskus

Forage, playing and sleeping trees become trees that are often cut down to meet community household needs

Low understanding of the community about the role and function of Kuskus for the environment

Kuskus meat is often a need for animal protein for the community so it is often hunted

The low level of community knowledge in supporting reforestation in Wakasiu Village in supporting the availability of food sources for Kuskus' trees

| No | Factor Strategies | Quality | Rating | Influence Value |
|----|-------------------|---------|--------|-----------------|
| 1  | Laws and regulations that define Kuskuses as protected animals | 0,2     | 4      | 0,8             |
| 2  | The high level of community participation in supporting the conservation of Kuskus' habitat in the forest | 0,3     | 3      | 0,9             |
| 3  | There are regulations in the village regarding animals that are allowed to be eaten and which cannot be eaten | 0,2     | 3      | 0,6             |
| 4  | Has attractiveness as an object of ecotourism (unique and rare animals) | 0,2     | 3      | 0,6             |
| 5  | The population can still support captive activities | 0,1     | 3      | 0,3             |
|    | **Total**         | **1.0** | **3.3**|                 |

Table 17. External strategies

| No | Factor Strategies | Quality | Rating | Influence Value |
|----|-------------------|---------|--------|-----------------|
| 1  | High hunting of Kuskus | 0,3     | 4      | 1,2             |
| 2  | Easy access to Kuskus habitat in Wakasiu village | 0,1     | 3      | 0,3             |
| 3  | Having a high economic value as animal protein | 0,1     | 2      | 0,2             |
| 4  | There is no written prohibition on hunting Kuskus | 0,3     | 3      | 0,9             |
| 5  | Low monitoring of the Kuskus population | 0,2     | 4      | 0,8             |
|    | **Total**         | **1.0** | **3.4**|                 |

Based on the analysis of the influence value of the Tables and Tables, then the IFAS value is calculated which is the total difference in the value of the internal influence of strengths and weaknesses, namely 4.20 - 3.30 = 0.9, while the EFAS value which is the difference in the total value of the influence of external factors, opportunities and threats, which is equal to 3, 20 - 3.40 = - 0.2. The
results obtained indicate that the IFAS value (+) means that the cumulative strength factor is greater when compared to the weakness factor. While the EFAS value (-) means the cumulative opportunity factor is smaller than the threat factor.

4. Conclusion

1. Potential for 24 species of Kuskus' feed-in Wakasiu village, with the highest IVI values for the tree level, are durian (*Durio zibethinus*), duku var. aqua (*Lansium parasiticum*), and nutmeg (*Myristica fragrans*).

2. Insitu Conservation Strategies that need to be carried out in support of Kuskus conservation are: a. Developing Kuskus' tourist attraction objects, b. Optimizing the role of the surrounding community in planning and developing objects of ecotourism that are focused on developing endemic and community-based flora and fauna, Improve the protection of the preservation of the area through law enforcement.

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