ACTIVITY IMPLEMENTATION REPORT

PROJECT INVESTING IN THE KOMODO DRAGON AND OTHER GLOBALLY THREATENED SPECIES IN FLORES

PREY ANIMAL INVENTORY AND HABITAT ASSESSMENT OF KOMODO DRAGONS ON LONGOS ISLAND, WEST MANGGARAI DISTRICT

EAST NUSA TENGGARA NATURAL RESOURCES CONSERVATION CENTER

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ENDORSEMENT SHEET

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PREY ANIMAL INVENTORY AND HABITAT ASSESSMENT OF KOMODO DRAGONS ON LONGOS ISLAND, WEST MANGGARAI DISTRICT

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ABSTRACT

Komodo dragon (*Varanus komodoensis*) is a reptile species from the Varanidae family that is classified as threatened (EN) on the IUCN red list (Jessop et al. 2021). In addition, the Komodo dragon, which has the local name ora, is also the flagship species in the Komodo National Park area and is listed in appendix I of CITES, which indicates that the utilization by selling this species is prohibited both alive and in body parts. Komodo dragons are spread across four populations within Komodo National Park with the largest populations on Rinca Island, Padar Island and Wae Wuul Nature Reserve. Furthermore, Komodo dragons are also found on Longos Island and Flores Island. There is an assumption that when animals that are preyed upon by Komodo dragons are found, it marks the presence of Komodo dragons. So this research aims to identify Komodo prey animals and their habitat conditions on Longos Island using *maximum entropy* (Maxent) so that the results of spatial modeling of habitat suitability can be a consideration for managers in managing areas that have high habitat suitability for Komodo prey animals. In addition, the results of this study also provide an overview of the alleged existence of Komodo dragon food resources whose habitat continues to experience pressure. The data used are data on Komodo dragon prey encounters, both direct and indirect encounters (tracks, feces, feeding traces) using the *concentration count* and *rapid assessment* methods. In addition, data on environmental variables were also used by downloading. The results of this research in November 2024 found 3 types of Komodo prey animals, namely Red-footed Gosong Bird and Long-tailed Monkey and cattle (livestock). These results illustrate the potential food sources and habitats for the sustainability of Komodo dragon species conservation on Longos Island, which is dominated by land cover, namely shrubs. Maxent modeling results show that there are 120.23 ha (25.1%) of suitable areas for Komodo dragon prey. Furthermore, there are 3 classes of suitability from 25.1%, namely 24.5% (29.45 ha) predicted to have low suitability, 48.2% (57.99 ha) medium suitability, and 27.3% high suitability (32.79 ha).

Keywords: Komodo dragon, maxent, modeling, prey animal, environmental variables

FOREWORD

Praise and gratitude are due to Allah subhanahu wa ta'ala for all His gifts so that this research report can be successfully completed. The title of this multi-party research activity is "Prey Animal INVENTARISATION AND HABITAT ASSESSMENT OF KOMODO ON LONGOS ISLAND, WEST MANGGARAI DISTRICT".

The author would like to thank the INFLORES Project Board, BBKSDA NTT, and Undana for their full support in terms of funding and assistance during the activity. A very big thank you also goes to the extraordinary team, Fadlan Pramatana, S.Hut., M.Si, as well as the strong field team, Gesthy, Fidelina and Arlan as well as Mr. Sahudin and Mr. Rio who have helped to collect data in the field. In addition, the author would like to thank the entire Longos Island community for their assistance and hospitality.

Hopefully this scientific study can be useful for many parties in need and for the advancement of science.

The author

December 2024

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CHAPTER I

INTRODUCTION

a. Background.

Komodo dragon (*Varanus komodoensis*) is a reptile species from the Varanidae family that is classified as threatened (EN) on the IUCN red list (Jessop et al. 2021). In addition, the Komodo dragon, which has the local name ora, is also the flagship species in the Komodo National Park area and is listed in appendix I of CITES, which indicates that the utilization by selling this species is prohibited both alive and in body parts. Komodo dragons are only distributed in four populations within Komodo National Park, with the largest populations on Rinca Island, Padar Island and Wae Wuul Nature Reserve (Ciofi and de Boer 2004; Jessop et al. 2007; Purwanda et al. 2014; Ariefiandy et al. 2013; Ariefiandy et al. 2017). Santosa et al (2014) reported that on Rinca Island, Komodo dragons often cluster in certain places such as guard posts or forest areas during the dry season.

In 1980 Komodo National Park was established to protect a large part of the Komodo monitor lizard's range which includes Komodo Island, Rinca, Padar, Gili Motang, and Nusa Kode. Subsequently, in 1985, several Nature Reserve Areas (KSA) were also established to protect the Komodo monitor lizard's distribution area on Flores Island: Wae Wuul Nature Reserve (CA) on the west coast, Wolo Tado CA, Riung CA and TWA Tujuh Belas Pulau on the north coast. These four locations are under the management of the Natural Resources Conservation Center (BBKSDA) of East Nusa Tenggara (NTT) Province. There are many pockets of habitat scattered across the island of Flores, but they are classified as having low population densities (Ciofi and de Boer 2004).

Threats to the existence of Komodo dragons include habitat degradation and the presence of potentially invasive animals in the area. In addition, hunting of prey animals, baiting (Santosa et al 2012), and massive development are threats to the existence of Komodo dragons. Ardiantono et al. (2018) reported that there are long-term consequences when Komodo dragons' natural existence comes into contact with tourism activities. Komodo dragons will lose their natural hunting instincts and begin to consistently expect leftover food or food provided by visitors to tourist areas.

Mustari (2011) states that there are five types of large mammals that are prey animals for Komodo dragons, namely timor deer, water buffalo, wild horses, wild boar and long-tailed monkeys found on Rinca Island. Meanwhile, since 2008, BBKSDA NTT with the Komodo Survival Program (KSP) conducted a population study of Komodo dragons and their prey animals in the Wae Wuul CA area, stating that there are still main prey animals for Komodo dragons in the area, namely deer, water buffalo, and wild boar. Thus, it can be assumed that when found

The presence of an animal that is a prey animal of the Komodo dragon is a sign of the Komodo dragon's presence. The distribution of prey animals on Rinca Island is random and the number is quite large (Mustari 2011). Therefore, this research is proposed to model the presence of komodo prey animals on Longos Island, which is considered a meeting point for komodo dragons. This research also supports the conservation of priority animals that are currently threatened by land use change, so that the results of spatial modeling of habitat suitability can be a consideration for managers in managing areas that have high habitat suitability for komodo dragons. In addition, the results of this study also provide an overview of the alleged existence of Komodo dragon food resources whose habitat continues to experience pressure.

b. Problem formulation

Based on the background description, the research problem is formulated, namely:

- What are the prey species of Komodo dragons on Longos Island?
- What is the extent of suitable habitat for Komodo dragons on Longos Island?
- What is the condition of potential komodo dragon habitat on Longos Island?

c. Objectives

The objectives of the Flores Big Mouse (Papagomys sp) Identification and Distribution Study in Region II BBKSDA NTT are as follows:

- Inventorying Komodo prey animals on Longos Island.
- Identify Komodo dragon habitat (extent and habitat condition) in Longos Island.

d. Benefits

The benefits of this study can be felt by the community, researchers, and related conservation stakeholders (BBKSDA NTT). Benefits for BBKSDA NTT are:

- Provide information on Komodo dragon habitat conditions and the presence of prey animals for Komodo dragons on Longos Island.
- Serve as material in the formulation of Komodo dragon

conservation strategies for the local government:

- Provides input in the formulation of regional biodiversity management/conservation plans.
- Increased efforts to protect life support systems through government policies based on recommendations from activities/research results

For the community:

- Provide information to the public about the big rat species in Flores.

so that people know that there are animal species that must be protected.

For researchers:

- Provide preliminary research for further research on the protection of important species and their habitats.

e. Research Limitations

This study was limited to direct and indirect observations of Komodo dragon prey species. This study is limited in terms of time, cost and energy as well as some physical and climatic conditions at the study site.

CHAPTER II
THEORETICAL FRAMEWORK

a. Theoretical foundation

The conservation of komodo dragons is not only centered on the main species, but requires studies from various aspects, including prey animal studies and habitat ecology to support the sustainability of komodo dragons. There are at least five large mammals that are the main prey animals of Komodo dragons on Rinca Island, namely deer, buffalo, horses, pigs, and long-tailed monkeys. Species distribution modeling is one of the alternatives in predicting the relationship between a species and its environmental characteristics. This modeling has great potential and is widely applied in various fields of ecology and conservation. The resulting model can be the basis for further conservation action in habitats that are predicted to have potential as a species habitat.

The decline and/or disappearance of Komodo dragons from an island is thought to be caused by things related to the declining quality and quantity of habitat in terms of food, water and cover, including other animals related to the lives of Komodo dragons. Thus, the presence of Komodo dragons is related to the presence of their prey animals such as water buffalo, long-tailed monkeys, timor deer, wild boar, and wild horses. The food sources of Komodo dragon cubs are small mammals, various types of birds, and small reptiles can still be found on Longos Island, but their availability (population) needs to be considered by improving the habitat and cover of these prey animals.

b. Hypothesis

Based on reports from previous studies, there are prey species that have been recorded on Longos Island and livestock that are prey for Komodo dragons.

CHAPTER III
RESEARCH METHODOLOGY

a. Basis for implementation

This activity was carried out on the basis of a self-management contract Number: PK.04/K.5.TU/PEG.3/07/2024 concerning Activities for Identification of Flores Large Rats (Papagomys sp) and Prey Animal Inventory and Komodo Habitat studies on Longos Island along with a Letter of Task with number ST. 850/K.5/BKWII/PEG.3/11/2024 concerning Prey Animal Inventory and Komodo Habitat Study on Longos Island, West Manggarai Regency.

b. Location and time of implementation

This research was conducted on Longos Island from November 29 to December 8, 2024 based on the previous distribution of camera trap installation locations by KSP and BBKSDA NTT (Figure 1).

Figure 1 Map of the research location on Longos Island

Administratively, the island is located in Macang Pacar and Boleng sub-districts, West Manggarai Regency. There are two villages on Longos Island, namely Nanga Kantor Barat Village and Mangge Village. Vegetation includes secondary forest, mangrove forest, and teak and lamtoro plantations owned by residents (Irawan 2017).

c. Implementation team

This activity has been carried out by a research team consisting of lecturers, students, and BBKSDA NTT staff (Table 1).

Table 1 Details of the implementation team for the prey animal inventory and komodo dragon habitat study on Longos Island

No.	Name / NIP	Position
1.	Yusratul Aini, S.Hut, M.Si / 19960214 202203 2 019	Teaching Staff at Nusa Cendana University
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3.	Fidelina Sulastri Haba, S.Hut	Alumni of Undana Forestry Study Program
4.	Gesthy Selvina Mansari, S.Hut	Alumni of Undana Forestry Study Program
5.	Arlan Ena Aulu	Student of Undana Forestry Study Program
6.	Sahudin	PEH Executive at Conservation Section Region III of the KSDA Division of Region II of the NTT KSDA Center
7.	Rio Antariksa Sandes/	POLHUT Implementing in the Region III Conservation Section Field of KSDA Wil. II of the NTT KSDA Center

d. Data collection method

Data type

The data collected were primary and secondary data. Primary data included animal encounter points, encounter points derived from previous research, and environmental variables. Primary data were obtained from direct observation and spatial data processing. Direct observation of Komodo dragon prey animals using *rapid assessment* and *concentration count* methods. Observers record the types of mammals found during site surveys or walking outside of observation hours which can be combined with the *concentration count* method by making observations in places that are thought to have a high chance of animal encounters (Bismark 2011). Secondary data is processed data from managers and related parties. Primary and secondary data in this study are divided into 2 types of data, namely *vector* data and *raster* data. The data collected for the study are shown in Table 1.

Table 2 Types of data, data sources, data collection methods, and types of data collected

Data Type	Data Source	Data collection method Data
Point Komodo Prey Animal Encounter Point (presence)	Observation, internet, journals, articles, reports, thesis, thesis, dissertation	Observation direct observation, literature study

RBI map	BIG or INAGEOPORTAL	Download
DEM	Earthexplorer.usgs.gov or INAGEOPORTAL	Downloading, literature study, and processing from
Lansat 8 image	Earthexplorer.usgs.gov	(Image Downloader, desk study, and processing from Landsat 8 baseline)
Temperature Region Map	Area Manager Earthexplorer.usgs.gov	Downloading (Downloading imagery and data processing Landsat 8)

Prey Animal Encounter Points

This research began by collecting encounter points with Komodo dragon prey based on direct observation and previous research. Data collection of Komodo dragon prey encounter points on Longos Island used rapid assessment and concentration count methods. The rapid assessment method is a method to determine the types of mammals found at the observation location. Observers record the types of mammals found during site surveys or walking outside of observation hours (Bismark 2011). The concentrated observation method is an observation carried out at a point suspected of being a place with a high chance of animal encounters (Bismark 2011). In addition, data on the presence of Komodo dragon prey is also obtained from literature studies that have been carried out by individuals or institutions. The presence of prey species will be collected using digital *kobo collect form*.

Environmental Variables

Stages related to environmental variables are mapping variables that are considered close to real to predict the presence of komodo prey animals based on literature studies. These variables will be used to generate predictions of habitat suitability for Komodo dragon prey. These environmental variables represent physical and biological conditions that match field conditions. These physical conditions include distance from water source, distance from road, distance from settlement, distance from forest edge, surface temperature, vegetation index (NDVI), slope, and altitude (table 2).

Table 3 Variables to be used in modeling the suitability of komodo dragon prey habitat and data sources

Data Source	Collection Method Data	Environmental Variable Data
Digital Elevation Model (DEM)	Download from DEMNAS	Elevation Slope
USGS	Download from *USGS website*	*NDVI* *NDMI*
RBI	Download from inageoportal	Distance from Road Distance from Water Source Distance from Settlement
WorldClim	Download from worldclim.org website (Fick & Hijmans, 2017)	*Bioclimatic Variables*

The first stage is geometric correction by changing the coordinate system according to the location of BBKSDA NTT using the UTM (*Universal Transverse Mercator*) coordinate system zone 51S with WGS 1984 datum. Furthermore, image cropping is carried out which aims to emphasize the boundaries of the research location to facilitate researchers in conducting analysis on the study area (Santi 2011). This cropping uses *extract by mask* between the polygon area of BBKSDA NTT which is considered to have komodo dragons in it against the satellite image used. The resulting map from Landsat 8 is a map of the distribution of NDVI values and surface temperature (LST). The NDVI map was created with band 5 and band 4 of Landsat 8.

Landsat 8 data processed into a temperature distribution map according to Chen *et al* (2001) can be converted into other variables with the assumption that the emission is always one. The making of this temperature distribution map was carried out using Arcgis 10.8 by converting *Digital Number* into spectral radians, and converted into temperature. The equations used in the conversion are based on USGS (2002) to obtain a temperature distribution map with the following equation:

1. *Top of Atmospheric Spectral Radiance*

$$L\lambda = (\ Radiancemult\ x\ Digital\ number\ ) + Radiance\ add$$

Description

Lλ : Spectral Radiance

Radiance mult : Landsat 8 image value in .MTL format (band 10 and band 11)

Radiance add : Landsat 8 image values in .MTL format (band 10 and band 11)

Digital number : Raster value of the study location (band 10 and band 11)

2. *Brightness Temperature*

Description

T: *Top of atmosphere brightness temperature*

K2 : Calibration constant 2 (band 10 and band 11) K1

: Calibration constant 1 (band 10 and band 11) Lλ :

Spectral Radiation

3. *Land Surface Emissivity*

$$Pv = \left(\frac{NDVI - NDVImin}{NDVImax - NDVImin}\right)2$$

Description

Pv : Proportion of vegetation

NDVI : vegetation index NDVImin : Smallest vegetation index

value NDVImax : Largest vegetation index value

$$E = m\,Pv + n$$

Description E: Emicity

m : Vegetation emissivity value - soil emissivity value (0.004)

n : Soil emissivity value+ (1 - soil emissivity value) (0.986)

4. *Land Surface Temperature* TB = (hc/kλ) * ln

((K2 / (L - K1)) + 1) - 273.15

Description

LST : *Land Surface Temperature*

T *: Top of atmosphere brightness temperature*

λ : Wavelength (band 10 and band 11)

ρ : h * c / δ (h = Planck's constant 6.626 * $10^{(-34)\ J.}$s ; c= speed of light 2.998 * 10^{8}m/s ; δ = boltzmann constant 1.38 * $10^{(-23)}$ J/K)

E *: Land Surface Emissivity*

a. Bioclimatic Variables

Bioclimatic variables are generated from data processing downloaded from worldclim.org. Bioclimatic variables are then subjected to a *clipping* process or raster cutting based on the *maximum extend* or study area boundary. There are 19 bioclimatic variables that can be used to describe habitat (Fick & Hijmans, 2017).

b. Prediction of Prey Animal Habitat Suitability

Determination of habitat suitability is processed through spatial modeling using *Maximum Entropy Species Distribution Modeling software* (MaxEnt 3.4.1). Spatial modeling data processing using MaxEnt requires animal presence point data in .csv format and environmental variables in ASCII (.asc) format (Phillips, 2005). Environmental variables processed in MaxEnt must have been tested for multicollinearity (Baek et al., 2019; Li & Ding, 2016; Oxoli et al., 2017). All environmental variables in this study were subjected to correlation analysis and environmental variables that have an absolute value of 0.5 will be removed and not continued in the processing process in MaxEnt *software* (McCarthy et al., 2015; Pramatana et al., 2023).

Vegetation Data

The method used to determine the species composition is vegetation analysis using the plot line method with a plot area of 20 x 20 m as many as 10 plots at each altitude in the direction of the contour line. Laying transects at each altitude starts from the lowest altitude, for example at an altitude of 900 m above sea level in the Mutis Timau area and 100 m above sea level at the next altitude, namely 1000 m above sea level, 1100 m above sea level and so on. Vegetation analysis is a way of studying the arrangement (species composition) and shape (structure) of vegetation or plant communities that exist in the observation location. This vegetation analysis uses a combination method between the path method and the plot line method (Figure 1).

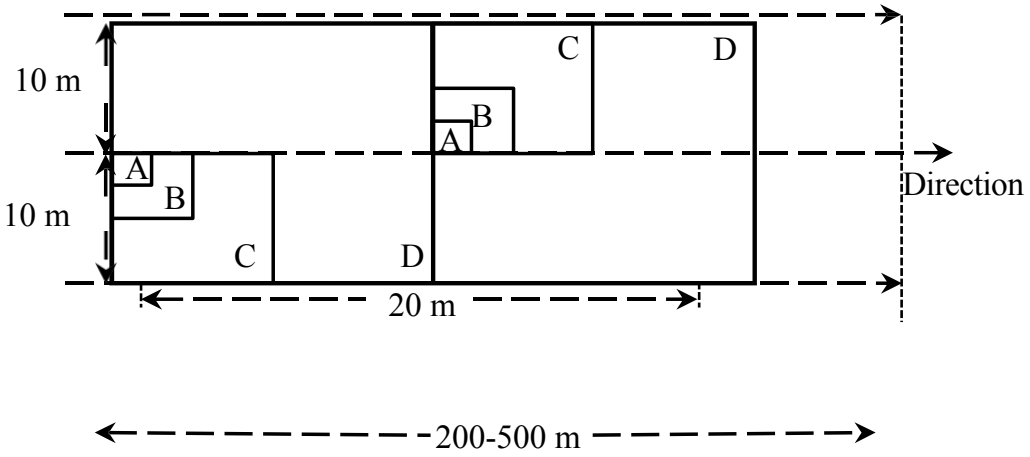

Figure 2 Illustration of Plant Survey Striped Path

Description:

A = Measurement plot for seedlings and understorey (2 x 2 m)

B = Measurement plot for saplings (5 x 5 m)

C = Measurement plot for poles (10 x 10 m)

D= Measurement plots for trees, epiphytes, lianas and parasites (20 x 20 m)

In this survey, observers need to be accompanied by local people who are familiar with plant species to facilitate survey activities.

Prey Animal Modeling

Data Analysis Technique

The habitat suitability modeling data analysis process uses two types of data, namely, data on the presence of komodo prey animals and environmental variables. Data on the presence point of Komodo dragon prey is stored in comma separated value (csv) format and continuo us data for environmental variables in ASCII (asc) format. Before the environmental variables are entered into the Maxent application, all environmental variables in Table 2 need to pass the multicollinearity analysis stage which aims to determine the closeness of the variables so that they can significantly affect the results. Shrestha (2020) states that multicollinearity causes significant variables to become insignificant in statistical analysis. Multicollinearity analysis is carried out in Microsoft excel with a value range of -0.75 (negative) and 0.75 (positive).

After passing the multicollinearity test stage, all point data and environmental variables were entered into the MaxEnt application. The Maxent application settings continue to use the default display. MaxEnt application will provide 25% of the data as testing data and 75% as training data (Singh et al. 2017). Meanwhile, the replication used in the settings is 10-15 times to consider the time used for data processing and the resulting output.

Validation of the habitat suitability model generated by MaxEnt uses the AUC (Area Under Curve) test or the area under the ROC (Receiver Operating Curve) to identify the sensitivity and specificity of the model. In addition, the AUC value is seen to see the accuracy of model predictions.

distribution (Lobo et al. 2008). Finally, the model will be accepted if the AUC value is > 0.5, indicating that the presence points of species and variables overlap (Swets 1988; Fielding and Bell 1997). Furthermore, the Jackknife results will show the contribution of each environmental variable to the model, indicating how important an environmental variable is to the presence of Komodo dragon prey. In addition, the response curve also shows the effect of environmental variables on the model quantitatively. Yiu (2016) states that the response curve shows the relationship between species presence points and environmental variables, a value close to 1 indicates a good index value.

The results of MaxEnt *software* processing are divided into three classes with *geometrical interval*, which is a data classification that divides data into intervals determined based on a certain geometric series. Validation of the MaxEnt model results can also be done by looking at the AUC (*Area Under Curve*) value, if the AUC value is below 0.5 then the model is not acceptable, while if the AUC value is 0.5 - 0.7 then the model has a fairly good accuracy value or low accuracy, and if the AUC value is 0.7 - 0.9 then the model has medium accuracy, and if the AUC value is more than 0.9 then the model has high accuracy (Lobo et al., 2008; Phillips, 2005).

Habitat suitability map

The final output of spatial modeling of habitat suitability for Komodo dragon prey is a habitat suitability map. The best chance of presence is when the Habitat Suitability Index (HSI) value is close to 1, and the MaxEnt result is close to 0, indicating a low level of closeness/compatibility.

Important Value Index (INP)

For plant species, data from vegetation analysis is used to generate data on density, dominance, frequency, and the vegetation Important Value Index (INP). This data can be used as potential supporting vegetation for the life of Komodo dragons and their prey in nature. Data from vegetation analysis were calculated using the following formulas (Indriyanto, 2012):

$$\text{Density (K)} = \frac{\text{Number of Individuals of a Type}}{\text{Total Area of Sample Plots}}$$

$$\text{Relative Density (KR)} = \frac{\text{Density of a Species}}{\text{Density of All Species}} \times 100\%$$

$$\text{Dominance (D)} = \frac{\text{Area of Base Area}}{\text{of All Sample Plots}}$$

$$\text{Relative Dominance (DR)} = \frac{\text{Dominance of a Species}}{\text{Dominance of All Species}} \times 100\%$$

$$\text{Frequency (F)} = \frac{\text{Number of Plots Found of a Species}}{\text{Total Number of Plots}}$$

$$\text{Relative Frequency (FR)} = \frac{\text{Frequency of a Species}}{\text{Frequency of All Species}} \times 100\%$$

Important Value Index (INP) = KR + DR + FR

CHAPTER IV
DISCUSSION

a. General Description of Location and Object of Activity

Longos Island is located in Nanga Kantor Barat Village, Masang Pacar Subdistrict and Mangge Village, Longos Timur in Boleng Subdistrict where Komodo dragons live. Longos Island is one of the islands that holds natural wealth in the form of flora and fauna, located in the Flores region of East Nusa Tenggara. The main habitat on the island is open deciduous forest and mangrove forest, other habitats include settlements, sea, plantations, and beaches.On Longos Island there is not only the original habitat of the Flores Komodo dragon. There are also many long-tailed monkeys, wotong birds and cockatoos. There are also many bats nesting there, surrounding coral reefs and on the coastal part also thriving mangroves / natural mangroves, Longos Island itself has an altitude of between 10-30 meters above sea level, The western part of Longos Island tends to be drier so that the vegetation is not too diverse and is only filled with Tamarind (Tamarindus indica) and Lamtoro (Leucaena leuchocephala) while the eastern part of Longos Island is more diverse, for example, Saung Sensus (Balakacida), Forest water guava (Syzygium aqueum), Kusambi (Schleichera oleosa) and so on (Figure 1). Updating information on prey animals and habitat descriptions in the village is important for the continued conservation of komodo dragons and their prey animals.

b. Description of Prey

Animal Distribution Activity

Results

In this study, 3 potential prey species of Komodo dragons were found with a total of 26 points on Longos Island, namely Red-footed Gosong Bird (Megapodius reinwardt), Long-tailed Monkey (Macaca fascicularis), and domesticated cattle. These three species were found in both direct and indirect encounters (nests and feces). Furthermore, these three prey species were scattered throughout Longos Island. The habitat type found in the observation site is secondary forest (Figure xx). The forest is directly adjacent to the settlement, but local residents still maintain the sustainability of the Longos Island forest, one of which is by not hunting in the forest, so that Komodo dragon prey animals on Longos Island are still classified as wild.

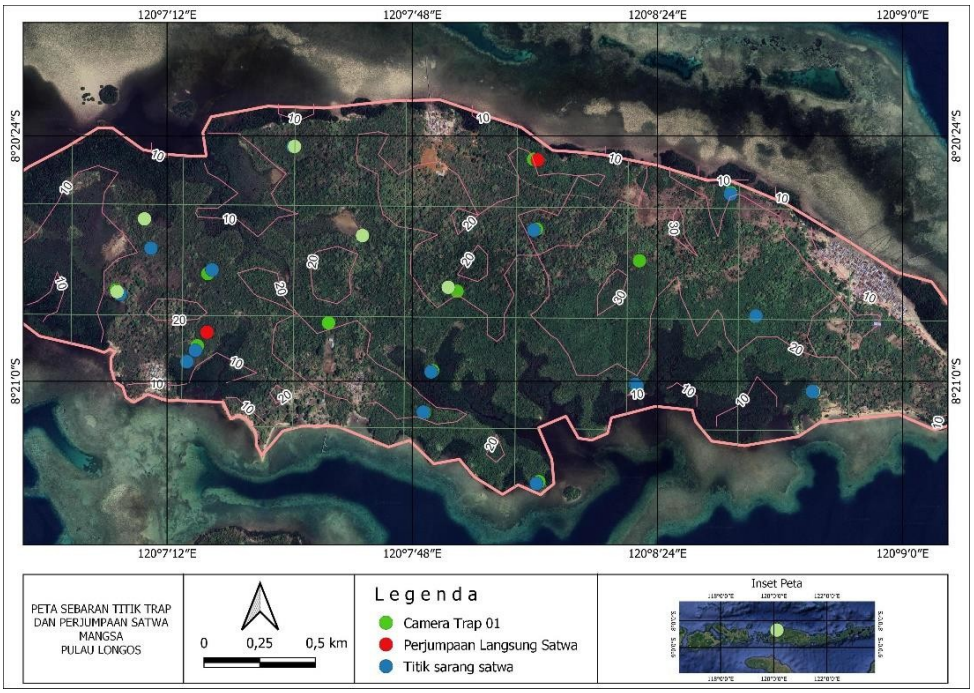

Figure 3 Distribution of Komodo prey animal finding points on Longos Island

Red-footed Gosong Bird (Megapodius reinward) nests are widely distributed on Longos Island with a type of nest made of soil that forms a mountain covered with litter and has more than one hole because one nest can be inhabited by more than one individual. In addition, the discovery of Long-tailed Monkey (Macaca fascicularis) feces was found around trees that have fruit, for example Tamarind (Tamarindus indica), while the discovery of cows is scattered in every area of Longos Island with diverse habitats in both dry and wet areas.

Vegetation Analysis

Based on the results of vegetation analysis conducted in the Longos Island area by taking 17 plots scattered on Longos Island by looking at prey animals directly or indirectly after that vegetation analysis is carried out covering seedling level, stake level, pole, and tree. This activity recorded 17 plant species from 8 families that could be identified to the species name and 8 plant species were only identified at the local name level.

Table 4 List of plant species on Longos Island

No	Local Name	Family	Name Scientific Name	INP
1.	Arunana (fig)	Moraceae	*Ficus* sp	6,10
2.	Acid	Fabaceae	*Tamaricus indica*	76,18
3.	Bidara	Rhamnaceae	*Ziziphus mauritiana*	6,10
No.	**Local Name**	**Family**	**Name Scientific**	**INP**

4.	Teak	Lamiaceae	*Tectona grandis*	14,91
5.	Kala code/calcodes	Piperaceae	*Piper* sp	12,39
6.	Kedondong Forest	Anacardiaceae	*Spondias pinnata*	39,35
7.	Kukung	-	-	20,56
8.	Lamtoro	Fabaceae	*Leucaena leucocephala*	13,19
9.	Mangosteen Forest	Clusiaceae	*Garcinia bancana*	6,82
10.	Menga	-	-	14,28
11.	Pampa	-	-	6,23
12.	Pedabote	-	-	9,49
13.	Rida	Apocynaceae	*Alstonia scholaris*	8,26
14.	Rombokaboe	-	-	6,47
15.	Sereo	-	-	36,17
16.	Sulo-Sulo	-	-	10,73
17.	Wila	-	-	12,78

Vegetation data on Longo Island is dominated by land cover in the form of shrubs. There is also mangrove land cover on Longos Island. This vegetation data was then analyzed to obtain an important value index (INP) at each vegetation level. Vegetation types that have the highest INP value at each vegetation level are more fully presented in Table 4.

(a)

(b)

(c)

(d)

Figure 4 Location of vegetation analysis data collection on Longos Island

Table 5 Highest INP value in each land cover and vegetation level

Vegetation Level	Local Name	Scientific Name	INP (%)
Seedling	Census	*Chromolaena odorata*	80.09
Stake	Kepate / Lamtoro	*Leucaena leucocephala*	65.43
Pole	Kepate / Lamtoro	*Leucaena leucocephala*	105.16
Tree	Tamarind	*Tamarindus indica*	76.18

From the observation results, there were 6 seedlings obtained. The dominating species at the seedling level is Sensu (Chromolaena odorata) with the highest INP value of 80.09%, while the species at the seedling level that has the lowest INP value is found in 2 species namely Sulo-Sulo (19.48%) and Tamba (19.48%). Balakacida leaf (*Chromolaena odorata*) or Saung Sensu is a weed plant that is spread throughout Indonesia. This plant grows in dry areas, mountains, and wetlands such as swamps. This plant is considered a weed because it grows quickly and extensively and reduces grass for shepherds. Balakacida plants (*Chromolaena odorata*) form the tip of the leaf, which is pointed where the two edges of the leaf on the left and right of the mother bone slightly upward and form an acute angle (<90 °). The shape of the base of the balakacida leaf (*Chromolaena odorata*) is slender or flat. The shape of the edge of the leaf is incised (divisius), the shape of the incision is serrated where the sinus and angular shape are both pointed. The shape of the stem is round, the direction of growth of the stem is perpendicular and on the stem there are hairs and the shape of the roots has a yellowish branching taproot arrangement.

Plant species at the sapling level found at the time of observation were 14 species. Of the 14 species of pacang have different INP values, the type of pacang that has the highest INP is Kepate or Lamtoro (*Leucaena leucocephala*) with an INP of 65.43. Based on the magnitude of the INP value, it can be seen that this species has the largest number of individuals compared to other species. Muhdi et al (2008),

stated that the Important Value Index (INP) can be used to determine the dominance of species in the plant community studied. The Important Value Index (INP) is used as a quantity that shows the position of a species against other species in a community. The greater the INP of a species, the more important its role in the community.

At the pole level the number of species found amounted to 9 species. The most dominant plant species is Lamtoro (*Leucaena leucocephala*) with an INP value of 105.16% and a dominant value of 39.56%. The dominant species at the pole level has similarities with the dominant species at the court level so that in the future the composition structure on Longos Island will be dominated by Lamtoro (Leucaena leucocephala). According to Kuswanto (2018), if a plant species is in an appropriate location, the growth of the plant will be well supported, and can become the dominant species. This is in accordance with the environmental conditions on Longos Island which has a secondary forest type, and has moderate soil fertility.

Plant species at the tree level found were 17 species. The species with the highest INP value is *Tamarind* (*Tamarindus indica*) the magnitude of the INP of this species is supported by the magnitude of the relative density value of 39.68%, relative frequency of 32.35% and relative dominance of 4.15% so it is called the dominant species. According to Smith (1977), what is meant by dominant species is a species that can utilize the environment it occupies efficiently than other species in the same place.

A species can be said to play a role if the INP for sapling and sapling levels is more than 10% and at and pole more than 15%. At the sapling level, the INP of *Tamarind* (*Tamarindus indica*) was 14.72% and at the pole level it was 47.51%. Judging from the INP value, it can be said that it can play a role in regeneration because the number is quite appropriate. Some species at the phon level are not found in seedlings, saplings and poles such as Forest Kedondong (*Spondias pinnata*) and Forest Mangosteen (*Garcinia bancana*) which indicates a small opportunity to regenerate so that it can cause individuals not found in tree habitus.

Environmental Variables

Environmental variables used include elevation, slope, vegetation forage index (*Normalized Difference Vegetation Index*), site moisture index (*Normalized Difference Moisture Index*), distance from roads, distance from rivers, distance from settlements, and 19 *bioclimatic variables* referring to (Fick & Hijmans, 2017).

Predicted Habitat Suitability of Komodo Prey Animals

a. *Maximum Entropy* Prediction of Habitat Suitability of Komodo Prey Animals

The results of the maximum entropy analysis using MaxEnt software version 3.4.1 resulted in an *Area Under Curve* (AUC) value of 0.899 (Figure 17). The AUC value is used

for model validation tests because it can show the accuracy of species distribution model predictions (Lobo et al., 2008). The distribution model is acceptable if it has a value > 0.5, indicating that species encounters and variables overlap (Fielding & Bell, 1997; Phillips, 2005; Swets, 1988). If the AUC value is< 0.5, it indicates that the model output is no better than using a random sample (Phillips, 2005).

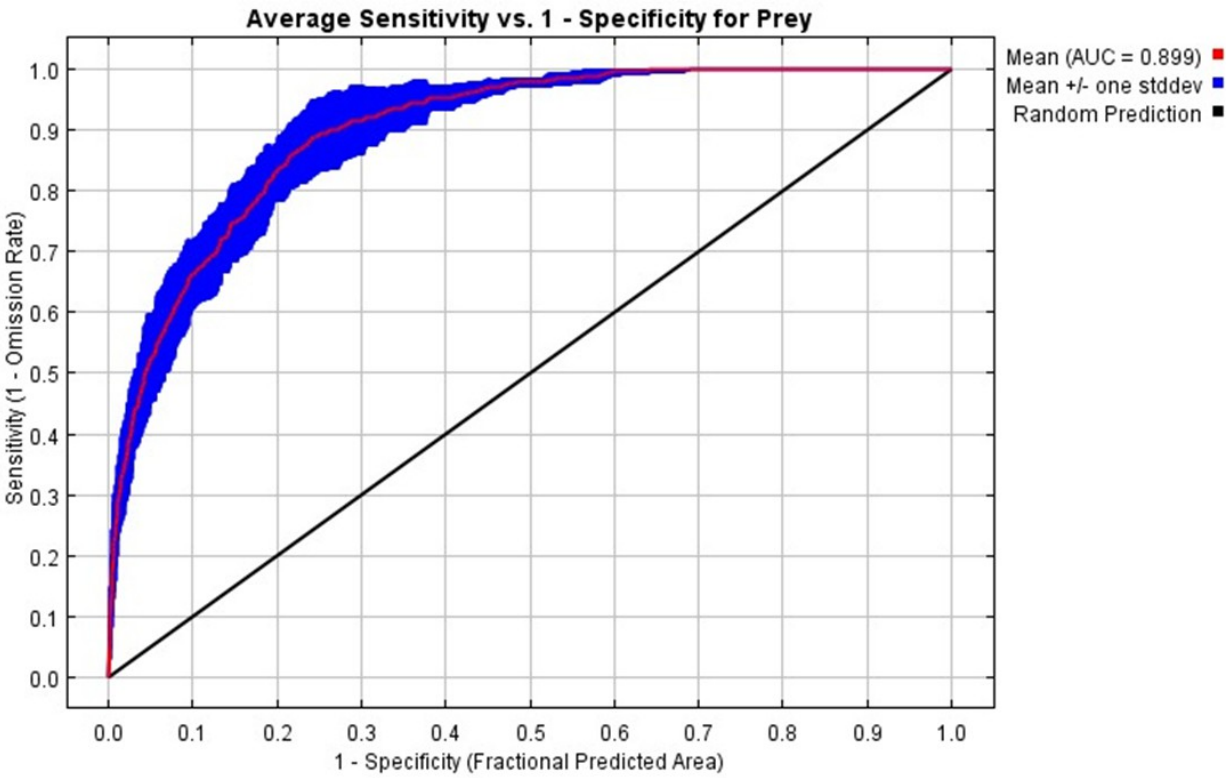

Figure 5 AUC results of the komodo dragon prey animal habitat suitability model

Maximum entropy analysis with six environmental variables resulted in the percent contribution of each variable to the model output (Phillips, 2005). The highest contribution value of variables to predict the suitability of komodo dragon prey habitat is the distance from settlements variable with a value of 20.2% and the lowest contribution value to the model output is the *Annual Mean Temperature* variable with a value of 0.5%. The percent contribution of each variable to the output of the komodo dragon prey animal habitat suitability model is more fully presented in Table 9.

Table 6 Percent contribution to the distribution model output

Environmental Variables	Percent Contribution (%)
Distance from Settlement	20.2
Elevation	18.1
NDVI	13.4
Isothermality	13.1
Distance from water source	12.4
Precipitation of Driest Quarter	11.5
Temperature Seasonality	5.2

Mean Diurnal Range	3.4
Slope	2.3
Annual Mean Temperature	0.3

The distance from settlement (sett) variable has the highest percent contribution value to the model output. The types of cattle, buffaloes and goats that are livestock around community settlements are found in areas that are in the vicinity of residential areas. This is evidenced by the high percent contribution of this variable compared to others. Then other prey animals predicted based on the results of village community information are scattered in savanna areas far from settlements and forest areas, namely wild boar, monkeys, and deer. Thus, areas with forest land cover will have high NDVI or vegetation forage index values. However, basically all environmental variables are inseparable from each other as constituents of Komodo prey animal habitat. The results of the analysis only illustrate the variables with the greatest contribution to the resulting model output.

Maxent modeling results show that the area suitable for Komodo dragon prey habitat is 25.1%. The total area that is not suitable is 74.9% (Figure xx).

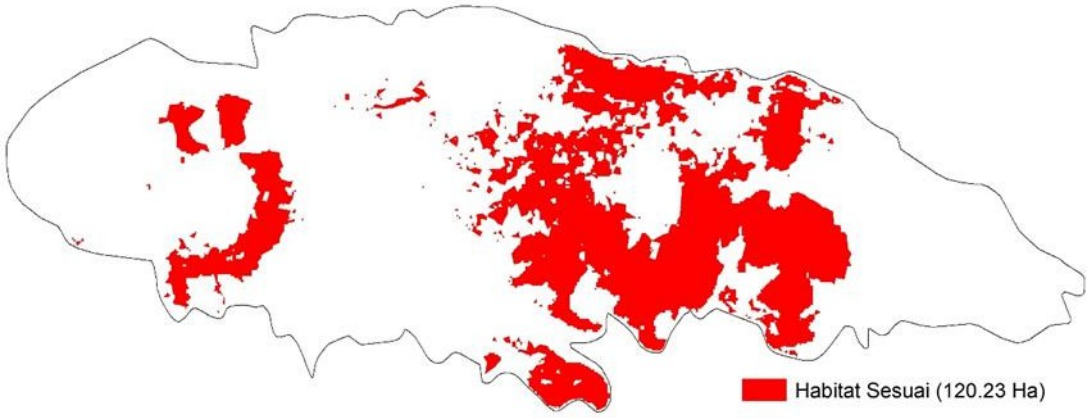

Figure 6 Prediction model output of komodo dragon prey habitat suitability

Validation of the *maximum entropy* output model uses the AUC value with the criteria that the model is acceptable if the AUC value is > 0.5 (Fielding & Bell, 1997; Phillips, 2005; Swets, 1988). The model output has an AUC value of 0.899 which is interpreted as an acceptable model. Several other methods for modeling the distribution of a species need to validate by *overlaying* encounter points with the resulting model, such as the use of *Principal Component Analysis* (PCA), linear regression, and logistic regression methods (Fitriana et al., 2016; Hermawan et al., 2019; Pramatana et al., 2022; Saadudin et al., 2012). The locations identified as suitable for Komodo dragon prey habitat were divided into three classes (low, medium, and high), resulting in the model output shown in Figure xx.

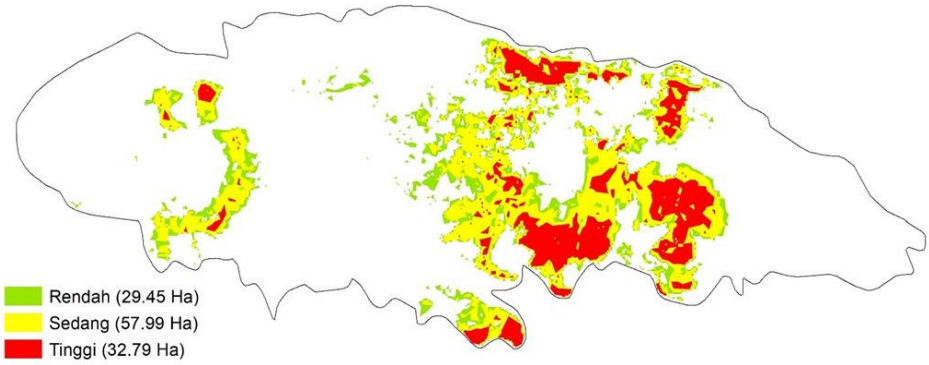

Figure 7 Classification of komodo dragon prey habitat suitability prediction model output

Habitat conditions on Longos Island support the sustainability of prey animal conservation with model results illustrating that 120.23 ha (25.1%) is suitable habitat with details of 24.5% predicted to have low suitability, 48.2% medium suitability, and 27.3% high suitability. Habitat conditions that support the conservation of prey animals are a major aspect as a potential food source in the conservation of komodo dragons. The presence of prey animals can be an indicator of the presence of Komodo dragons in nature. Food quality is also affected by the available environmental variables.

CHAPTER V CONCLUSION

a. Conclusion

The results of this study found 3 types of Komodo prey animals, namely Red-footed Gosong Bird and Long-tailed Monkey and cattle (livestock). These results illustrate the potential food sources and habitats for the sustainability of Komodo dragon species conservation on Longos Island, which is dominated by land cover, namely shrubs. Maxent modeling results stated that there are
120.23 ha (25.1%) of the area is suitable for the presence of Komodo prey animals. Furthermore, there are 3 suitability classes from the 25.1%, namely 24.5% (29.45 ha) predicted to have low suitability, 48.2% (57.99 ha) medium suitability, and 27.3% high suitability (32.79 ha).
low suitability, 48.2% (57.99 ha) medium suitability, and 27.3% high suitability (32.79 ha).

b. Suggestions

In the management of species and their habitats, it is also necessary to consider other aspects such as the people who are in the same area with the species. The interaction between the community and Komodo dragons on Longos Island can be positive or negative, so suggestions for further research are related to the home range or movement of Komodo dragons in their habitat on Longos Island.

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