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ANALYSIS OF DISTRIBUTION AND PRODUCTIVITY PATTERNS OF SWALLOW HOUSES (*COLLOCALIA SP*) IN KAMPAR REGENCY

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ABSTRACT

Swallow (*collocalia sp*) is one type of bird that produces high economic value nest. Besides being economically valuable, swallow birds also have ecological values that play an important role in controlling insect pests that are caught while flying (Risman, 1996 in Mardiastuti, 1999). Productivity of Swallow's Bird's Nest is influenced by various factors, one of which is the environmental conditions. This study aims to identify the distribution patterns of swallow houses, analyze the distribution of swallow houses according to ecological factors and determine the productivity level of swallow houses in each class of swallow ecological suitability in Kampar District. The research method used is descriptive quantitative method with professional judgment factors (Jaya, 2005) to find out the swallow ecology suitability class, the nearest neighbor analysis method (Average Nearest Neighbor, ANN) for analysis of swallow house distribution patterns and analysis of multiple linear regression tests to determine which affects the results of swallow house productivity. The pattern of distribution of swallow houses in Kampar Regency is cluster pattern, with an index of 0.239766. The swallow ecology suitability class consists of very suitable classes 63.42%, corresponding to 2.08%, rather suitable 24.33% and not suitable 29.97%. Productivity of swallow houses in Kampar Regency ranges from 220.73 kg / month. The variables that affect the results of swallow house productivity are the age of the swallow house and the suitability class while the building area does not have a significant effect on productivity outcomes.

Keywords: Swallow, Ecology, Swallow House, Pattern, Productivity

INTRODUCTION

Kampar Regency is one of the areas where swallows are cultivated in Riau Province, this can be evidenced by the development of swallow houses from time to time. Geographically, Kampar Regency is located at position 01^0 00'40 "LU - 00^0 27'00" LS and 100^0 28'30 "BT - 101^0 14 '30" BT, with an area of 11,433, 89 km^2 and consists of 21 sub-districts, and 245 villages. The northern boundaries are bordered by

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Pekanbaru City and Siak Regency. South is bordered by Kuantan Singingi Regency. the west is bordered by Rokan Hulu Regency and West Sumatra Province. East side is bordered by Pelalawan Regency and Siak Regency.

In Kampar Regency the construction of swallow houses is growing rapidly. This is because the requirements for swallow cultivation are fulfilled in Kampar Regency. The condition is to have a tropical climate and wet areas with a rainy season of six months in one year, have a vast and fertile forest area, have a fertile plantation area, have rivers and lowlands. However, the development of high swallow houses in Kampar Regency does not pay attention to micro ecological aspects (air temperature, air humidity and light intensity) and macro (altitude, proximity and source of feed / land use) swallow. Swallow houses that do not pay attention to the ecological aspects, are built in residential areas and roads. Less attention to these aspects results in the productivity of swallow nests often not maximally even failing (Rahayuningsih, 2008).

The purpose of this study was to identify the distribution patterns of swallow houses in Kampar Regency, analyze the distribution of swallow houses according to swallow ecological factors and determine the productivity level of swallow houses in each class of swallow ecology.

METHOD

The research method to be carried out is descriptive quantitative method, using Geographic Information Systems, based on a weighted quantitative overlay (overlapping method), classifications (Class), scoring (scoring), and weighting. The method used in weighting is a ranking method with professional judgment factors (Jaya, 2005), and the method used to analyze the distribution pattern of swallow houses is the closest neighbor analysis method (Average Nearest Neighbor, ANN). Furthermore, swallow house productivity was analyzed using multiple linear regression tests, so that it can determine the relationship between variables that affect productivity outcomes. This research starts from the identification of the area to be examined through location maps, determines the location of the existence of swallow houses (*Collocalia sp*) in Kampar Regency, determines the position of coordinates using the Global Positioning System (GPS), records and calculates swallow houses snowball sampling technique,

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swallow ecological parameters analyzed using classification methods Interpretation of Landsat imagery through a supervised classification method using e-Cognitionrule set mode with multiresolution and spectral differences fragmentation (Antomi, 2018). The types of land use are determined into seven groups, namely forests, plantations, fields, settlements, water sources, shrubs and vacant land. while for recording the results of swallow house productivity, namely by using a purposive sampling technique at the level of suitability of swallow ecology. The consideration in this study is that swallow houses that have produced at least 5 years and have relatively the same house criteria, such as three-storey houses, extensive management (using a tape recorder), and having an adjacent harvest schedule.

Average Nearest Neighbor

T = (Pujayanti dkk, 2014)…….(1)

Where T = nearest neighbor spread index; Ju = average distance measured between one point and the nearest neighbor point; Jh = The average distance obtained if all points have a random pattern.

The formula used to find the value of Jh, namely:

Jh = (Pujayanti dkk, 2014)…….(2)

Where Jh = The average distance obtained if said all points have a random pattern; P = Point density in square kilometers. Whereas, to get the P value first it must be searched using the following formula:

P = (Pujayanti dkk, 2014)……(3)

Where P = Point density in square kilometers; N = Number of points; A = Area in square kilometers.

Analysis of Swallow Ecology

The method used in weighting is ranking methods with professional judgment factors (Jaya, 2005).

$$\text{Total score} = W_1X_1 + W_2X_2 + W_3X_3 + W_4X_4 + W_5X_5 + W_6X_6$$
$$= 30\,X_1 + 25\,X_2 + 15\,X_3 + 15\,X_4 + 10\,X_5 + 5\,X_6$$

Where W = Weight for each parameter; X_1 = Habitat type / land use; X_2 = Height; X_3 = River / water source; X_4 = Road; X_5 = Temperature; X_6 = Humidity.

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Multiple Linear Regression Analysis

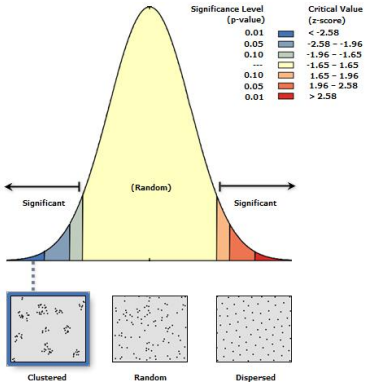
$$Y = a_0 + b_1X_1 + b_2X_2 + b_3X_3 + e$$

Where Y = results of swallow house productivity; a0 = Constants; b123 = regression coefficient of independent variable X1 = building area; X2 = Building age; X3 = Ecological suitability class; and e Epsilon (other independent variables not measured in research that have an influence on the independent variable).

RESULTS AND DISCUSSION

Pattern of distribution of swallow houses

The results of the research on the distribution patterns of swallow houses in Kampar Regency were 0.239766. Where, the value of the analysis of the nearest neighbor results from Observed Mean Distance is divided by Expected Men Distance. According to Pujayanti (2014) explains that, the analysis of the nearest neighboring index from 0 – 0,7 is classified into a cluster pattern. So the pattern of distribution of swallow houses in Kampar Regency, Riau Province in 2018 is classified as group.



Average Nearest Neighbor Summary

Observed Mean Distance:	523,7750 Meters
Expected Mean Distance:	2184,5284 Meters
Nearest Neighbor Ratio:	0,239766
z-score:	-26,698896
p-value:	0,000000

Dataset Information

Input Feature Class:	Swallow House
Distance Method:	EUCLIDEAN
Study Area:	6432877354,806942
Selection Set:	False

Figure 1. Results of Analysis of Average Nearest Neighbor Swallow Houses Walet, 2018 (Source: Researcher, 2018)

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Based on the map above, the total number of swallow houses is 337 distributed in North Kampar Subdistrict as many as 75 swallow houses, Kampar Subdistrict 59 swallow houses and Rumbio Jaya Subdistrict 50 swallow houses, Lower Kampar Kiri District and Tapung Hilir Subdistrict. While in Gunung Sahilan Subdistrict, Kampar Kiri Hulu Subdistrict, Perhentian Raja District and Tapung Subdistrict there are no swallow houses.

Table 1. Swallow Houses in 21 Sub-Districts in Kampar District

No	District name	Number of Swallow Houses
1	Bangkinang	23
2	Bangkinang Barat	15
3	Bangkinang Seberang	31
4	Gunung Sahilan	-
5	Kampar	59
6	Kampar Kiri	13
7	Kampar Kiri Hilir	1
8	Kampar Kiri Hulu	-
9	Kampar Kiri Tengah	6
10	Kampar Timur	10
11	Kampar Utara	75
12	Perhentian Raja	-
13	Rumbio Jaya	50
14	Salo	20
15	Siak Hulu	2
16	Tambang	11
17	Tapung	15
18	Tapung Hilir	1
19	Tapung Hulu	-
20	Kecamatan 13 Koto Kampar	3
21	Koto Kampar Hulu	2
Total		337

Source: Results of observations, 2018

Ecology of Swiftlet Suitability Classes

The results of the analysis of ranking methods for swallow ecology suitability in Kampar Regency consisted of four classes.

Table 2. Class Intervals of Swallow Ecology Suitability in Kampar District in 2018

No	Conformity Class	Information
1	> 315	very suitable
2	315 – 254	corresponding
3	253 – 192	rather appropriate
4	≤ 191	not suitable

Source: Researcher, 2018

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The above analysis is based on macro habitat factors (land use, height, proximity to roads and rivers) that affect the suitability of swallow ecology in Kampar District, and not micro habitat (temperature and humidity). The weighted weight of each indicator is, 35% land use, 30% height, 20% proximity to water sources and 15% proximity to road networks. The following is the distribution of swallow houses based on the ecological suitability class in Kampar Regency.

Table 3. Distribution of Swallow Houses Based on the Ecological Suitability Class in Kampar District in 2018

No	Conformity Class	Number of Swallow Houses	%
1	very suitable	147	63,42
2	corresponding	7	2,08
3	rather appropriate	82	24,33
4	not suitable	101	29,97
Total		337	100

Source: Researcher, 2018

Based on the table above, the number of swallow houses in the suitability class is very suitable, namely 147 swallow houses with a percentage of 63.42%, in the appropriate class there are 7 swallow houses or 2.08%, in the class rather suitable 82 swallow houses or 24.33% and in the incompatible class there are 101 swallow houses or 29.97%. The following is a table on the area of ecological suitability of swallow houses in each district, Kampar Regency in 2018.

Table 4. Extent of Ecological Suitability for Swallow Houses in Each District, Kampar Regency in 2018

No	Sub-District	Area of Ecological Suitability / km^2			
		Very Suitable	Corresponding	Rather Appropriate	Not Suitable
1	Bangkinang	120,37	36,06	7,91	2,30
2	Bangkinang Seberang	242,50	5,49	7,96	4,59
3	Bangkinang Barat	119,24	7,92	26,43	3,46
4	Gunung Sahilan	469,03	105,67	25,06	7,89
5	Kampar	94,74	14,86	6,15	1,20
6	Kampar Kiri	244,95	596,95	61,52	8,27
7	Kampar Kiri Hilir	405,51	307,70	58,81	2,88
8	Kampar Kiri Hulu	8,29	1.266,75	62,26	2,31
9	Kampar Kiri Tengah	240,90	53,65	21,65	6,55
10	Kampar Timur	144,97	9,34	17,22	2,07
11	Kampar Utara	70,96	2,30	12,91	2,47
12	Koto Kampar Hulu	245,03	192,74	46,01	3,15

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No	Sub-District	Area of Ecological Suitability / km²			
		Very Suitable	Corresponding	Rather Appropriate	Not Suitable
13	Perhentian Raja	99,10	2,38	0,08	2,93
14	Rumbio Jaya	70,03	1,93	7,71	3,59
15	Salo	169,70	24,70	6,53	6,56
16	Siak Hulu	543,18	89,16	61,33	4,64
17	Tambang	337,67	13,38	27,65	3,68
18	Tapung	927,90	41,57	57,86	9,09
19	Tapung Hilir	1.139,66	70,08	74,24	13,60
20	Tapung Hulu	1.104,72	29,44	86,12	11,93
21	Xll Koto Kampar	171,48	639,97	166,99	5,02
Total		6.970,93	3.512,46	842,50	108,18

The ecological suitability class is very suitable for swift birds scattered in the northwest to southeast, the corresponding classes are the south to the west, the classes are rather suitable spread across parts, while the inappropriate ones are spread in the northwest to the south of Kampar Regency.

Results of Swallow House Productivity

The total productivity of swallow houses in Kampar Regency is 220.73 - 300 kg / month. The results of swallow house productivity analyzed are, houses that have been produced (the age of the building using semi-active methods) at least 5 years. Based on the total number of swallow houses as many as 337, there are 77 houses that have produced a minimum of 5 years with a minimum production age range of 5 years - 10 years. Swallow house which has the dominant production age, namely 50 production ages 5 years, 18 production ages 6 years, 6 production ages 7 years, 2 production ages 8 years and 1 production age 10 years. The distribution of swallow houses in each sub-district is one in Kampar Kiri Hilir, Siak Hulu, two in Koto Kampar Hulu, three in Bangkinang District, Kampar Kiri Tengah, Kampar Timur, Mine and XII Koto Kampar, five in Bangkinang West and Tapung , four in Bangkinang Seberang and Rumbio Jaya, nine in Kampar and Kampar Kiri, and ten in Salo.

The variables that affect productivity results are analyzed using multiple linear regression X_1 = Building area; X_2 = Building age; and X_3 = ecological suitability class. The results obtained a significance value of X1 which is 0.184 so that H0 is accepted.

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This shows that the building area variable does not have a significant effect on swallow house productivity results. The significance values of X_2 and X_3 are 0.00 so that H1 is accepted. This shows that the age variable of the building and the class of ecological suitability together have a significant positive effect on the yield of swallow house productivity. The following is a table of multiple linear regression coefficients of swallow house productivity in Kampar Regency in 2018.

Table 5. Multiple Linear Regression Coefficients of Swallow House Productivity Results

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-4.773	.670		-7.127	.000
	Building Size (m^2)	-.003	.002	-.052	-1.342	.184
	Building Age (tahun)	.692	.113	.235	6.128	.000
	Ecology Suitability Class	1.302	.054	.915	24.055	.000
a. Dependent Variable: Hasil Produktivitas (kg/bulan)						

Source: SPSS Analysis, 2018

CONCLUSION

The pattern of distribution of swallow houses in Kampar Regency is grouped with an index of 0.239766. The distribution of swallow houses is scattered in the central part of the administration of Kampar Regency, namely in North Kampar District, Kampar District, Rumbio Jaya District, Bangkinang Seberang District and Bangkinang District. The results of swallow house productivity range from 220.73 - 300 kg/month. The yield of this productivity is influenced by the age variable of the building and the ecological suitability of swallow birds, not the building area.

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