

Nuraeni_2019_IOP_identification .pdf

by

FILE	NURAENI_2019_IOP_IDENTIFICATION.PDF (745K)	WORD COUNT	3259
TIME SUBMITTED	06-MAR-2020 10:01AM (UTC+0700)	CHARACTER COUNT	18001
SUBMISSION ID	1270272071		

PAPER · OPEN ACCESS

Identification of dragonfly and damselfly species around Mahaka river, Hasanuddin university teaching forest

³
To cite this article: S Nuraeni *et al* 2019 *IOP Conf. Ser.: Earth Environ. Sci.* **343** 012052

View the [article online](#) for updates and enhancements.

Identification of dragonfly and damselfly species around Mahaka river, Hasanuddin university teaching forest

S Nuraeni , Budiaman and S Yaspeta

Forest Protection and Insect Laboratory, Faculty of Forestry, Hasanuddin University, Makassar.

Email :nuraenisitti@gmail.com

Abstract. Odonata is a group of insects that have medium to large in size and attractive color. These insects play an essential role as biological controllers and environmental bioindicators. This study aims to identify the types of dragonflies and damselfishes that found around Mahaka River, Hasanuddin University Teaching Forest. This research was held in October 2018. Observation and retrieval of dragonfly and damselfly data were carried out using the line transect and plot method. The samples were taken from 3 (three) zones with the distance between zones is 15 meters. The results showed that there were 12 types of dragonflies and damselflies from 3 familia found, namely Libellulidae (8 species), Chlorocyphidae (1 species), and Coenagrionidae (3 species). The highest number of dragonflies and damselfly is founded zone I and sequently found in zone II and zone III. The most frequency of appearance is found in the morning observations, and sequently found in the afternoon and evening observations.

10

1. Introduction

Indonesia is one of the countries called "Mega Biodiversity" after Brazil and Madagascar [1] Indonesia is one country that has a very high species of flora and fauna. Indonesia is located in the tropics with a stable climate, and geographically is an archipelago located between two continents, namely Asia and Australia. So that Indonesia is rich in biodiversity, both plants and vertebrate animals such as fish, mammals, birds, amphibians, and reptiles until animals without vertebrae (invertebrates), especially insects. This is also supported by regional conditions in Indonesia, which have a good ecosystem for insect growth.

Insects are a group of Arthropods that have the highest diversity. One of the many insects found in Indonesia is dragonfly (Odonata), which is one of the orders in the Arthropod group. In tropical regions like Indonesia, there are various kinds of dragonflies with diverse habitats [2].

Odonata is a group of insects that are medium to large and often of the attractive color [3]. In general, the dragonfly's body consists of the head, thorax, and abdomen and has six limbs and two pairs of wings with different venation patterns in each species. Dragonflies have a relatively large pair of compound eyes because they almost cover all parts of the head [4]. The number of members of the Odonata Order spread throughout the world is estimated to be around 5000-6,000 with various habitat types [2].

Dragonflies are scattered throughout the world with very abundant quantities and are found in various habitat types. The ancestors of Odonata are one of the ancient insects, namely fossils of dragonflies *Megalotypus schuherti* which were found more than 200 million years ago [2].

Knowledge of dragonflies in Indonesia until now is still not well developed as is knowledge of



insects or other fauna. The number of species of dragonflies, both sub-orders of Anisoptera and Zygoptera, in Indonesia have not been answered with exact numbers. Dragonfly's knowledge exploration has been started for a long time when foreign researchers came to Indonesia. Foreign researchers mostly do publications about dragonflies in Indonesia. One of them was J. van Tol, a Dutch researcher, who examined members of the Genus Drepanosticta (Zygoptera: Platystictidae) and published it in 2006 .

Community knowledge of the role of dragonflies in the surrounding environment, especially in aquatic ecosystems is still very lacking. So that when directed at conservative activities, most people still doubt the critical value of dragonflies. Dragonflies have direct use values, namely consumptive and productive and indirect use values related to their role in nature as predatory insects and environmental bio-indicators.

The Education Forest of Hasanuddin University is located in Limapocoe Village, Cenrana District, Maros Regency, South Sulawesi Province. The Hasanuddin University education forest was established in 1980 with an area of \pm 1300 ha. One of the functions of Unhas Education Forest is that it can be used for research activities. Mahaka River is one of the rivers in the Hasanuddin University Forest Education area. This river has a length of about 2 km with an area of 10 m.

Exploration of dragonfly types in the Hasanuddin University Educational Forest, especially around the Mahaka River, does not yet exist, although the natural habitat of dragonflies in the form of water is available in large areas. So basic research such as identification of dragonfly types still needs to be done. It is necessary to explore information about the above thorough research on identifying the types of dragonflies around the Mahaka River, Forest of Education at Hasanuddin University. This research aims to identify the types of dragonflies found around the Mahaka River, Forest of Education at Hasanuddin University. The results of this study are expected to be the basis and preliminary data for biodiversity conservation in the Education Forest of Hasanuddin University and provide an overview of the type and population of current dragonflies.

6

2. Research methods

2.1. Research location

This research was conducted in October 2018 around the Mahaka River, Forest Education at Hasanuddin University, Cenrana District, Maros Regency, South Sulawesi Province. Map of research location can be seen as follows.

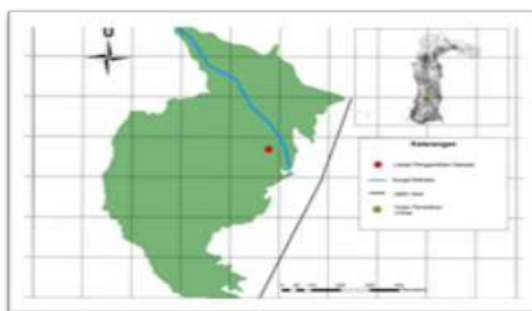


Figure 1. Map of research location

2.2. Tools and material ⁶ Research location

This research was conducted in October 2018 around the Mahaka River, Forest of Education at Hasanuddin University, Cenrana District, Maros Regency, South Sulawesi Province. ⁴ Map of research location can be seen as follows.

2.3. Research procedure

Determination of the location of observations.

Dragonfly observation location is a location around the Mahaka River, Forest of Education at Hasanuddin University. Observation and retrieval of dragonflies are carried out using the line transect and plot method. According to [5], the method of line transects and sample plots is a method of sampling samples of a population of ecosystems using a plot method located on a line drawn through the area of the ecosystem. Samples were taken from 3 (three) zone divisions. Zone I is the closest zone of the Mahaka River, which is 10 m from the perpendicular direction of the river [4]. The distance between zones is 15 m. In each zone, one transect was made with a length of 40 m, and three plots were created ⁷ on each transect, each plot measuring 10 × 10 m with 5 m as a plot distance [5]. Each plot counts the number of individuals in each type of sample obtained.

Measurement of environmental factors.

Environmental conditions (abiotic factors) were observed and measured during the study included temperature and humidity.

Sampling.

Collecting/capturing samples was done by using sweeping techniques. Observations and sampling were carried out throughout the day by dividing the observation time into three periods, namely morning at 07.00-10.00 local time, daytime at 11.00-14.00, and afternoon at 16.00-18.00 as local time. This is because at these hours, dragonflies are more comfortable to observe, and they include animals that are actively move foraging in the morning to evening [1]. Sampling was done for three weeks.

Identification of samples.

The sample obtained was put into the bottle and then soaked in 70% alcohol solution and dried. Dead samples were included in papillote paper and labeled. After that, stretched the wings and thorax of the dragonfly which was pierced using insect needles on the styrofoam then stored in a specimen box, kept dry and given camphor to avoid mold and ants, after which they were labeled and identified using the reference: Series of Know-Your-Field Dragonfly Guides by [6] and Key to Some Families of Odonata by [7]. Identification of the types of dragonflies was carried out by observing the morphological and color characteristics of the head (head), thorax (chest), and abdomen (abdomen) and venation on the wings of the dragonfly. The dragonflies that had been identified were then measured in body length and wing length. Dragonfly body length was measured from the head (head) to the abdomen (abdomen), while the dragonfly wings measured include the front wing and rear wing.

1

3. Results and discussion

3.1. Description of observation location.

The Mahaka River is located in a relatively flat area and at the end of the hill is quite steep and in the direction of the footpath for the population. The flow is not heavy, and the water is small during the dry season with sandy river beds and relatively large rocks. The vegetation around the Mahaka River is *Arenga pinnata*, *Mangifera indica*, *Alstonia scholaris*, *Ficus* sp., *Melastoma* sp., and *Lantana camara*. The coordinates of the dragonfly observation location are located at $0^{\circ}48'28''$ - $0^{\circ}48'29''$ North latitude and $94^{\circ}30'43''$ - $94^{\circ}30'44''$ East longitude.



Figure 2. Dragonfly observation location

The average air temperature around the Mahaka River is 32.590C with an average humidity of 46.14%. This means that the temperature and humidity are within the optimal temperature and humidity range of insects. Temperature affects the activity and development of insects and the geographical spread of insects, while humidity affects the evaporation of insect body fluids and selection of suitable habitats.

3.2. Types of dragonflies found in the observation zone.

The results of research conducted in three observation zones around the Mahaka River, Hasanuddin University Education Forest showed that there were 12 species of dragonflies found namely *Brachydiplax chalybea*, *Brachythemis contaminata*, *Diplacodes trivialis*, *Neurothemis terminata*, *Orthetrum glaucum*, *Orthetrum sabina*, *Pantala flavescens*, *Tholymis tillagra*, *Libellago lineata*, *Agriocnemis femina*, *Agriocnemis pygmaea*, and *Ischnura hastata* which consist of 3 families namely Libellulidae, Chlorocyphidae, and Coenagrionidae which are members of 2 large groups of Odonata namely sub-order Anisoptera (large dragonflies) and Zygoptera (needle dragonflies).

3.3. Number of dragonflies in the three divisions of observation zones

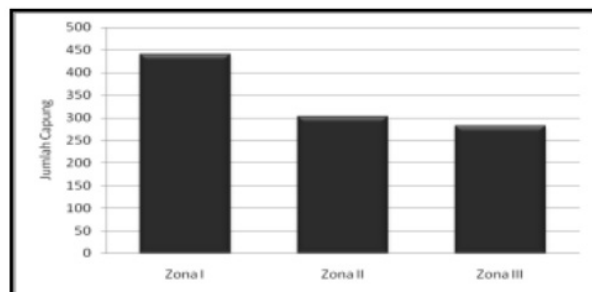


Figure 3. Diagram of the number of dragonflies in the three observation zones

Based on the results of observations of dragonflies carried out in three-zone divisions it can be seen in the graph that in a zone I there were 440 individual dragonflies, in zone II there were 303 individual dragonflies, and in zone III there were 282 individual dragonflies. The highest number of dragonflies was in the zone I, and there were zone II and zone III, respectively. This happened because the zone closest to the water source/river compared to other zones.

3.4. Comparison

Comparison of types of dragonflies sub-order of Anisoptera and Zygoptera in three-zone divisions

Table 1. Comparison of types of dragonflies sub-order Anisoptera and Zygoptera

Sub Order	Family	Species	Zone		
			I	II	III
Anisoptera (Ordinary Dragonfly)	Libellulidae	<i>Brachydiplax chalybea</i>	31	24	22
		<i>Brachythemis contaminata</i>	52	39	36
		<i>Diplacodes trivialis</i>	36	33	39
		<i>Neurothemis terminata</i>	65	61	54
		<i>Orthetrum glaucum</i>	39	15	11
		<i>Orthetrum Sabina</i>	40	37	43
		<i>Pantala flavescens</i>	77	64	59
		<i>Tholymis tillagra</i>	5	4	1
Zygoptera (Needle Dragonfly)	Chlorocyphidae	<i>Libellago lineate</i>	28	22	17
	Coenagrionidae	<i>Agriocnemis femina</i>	19	-	-
		<i>Agriocnemis pygmaea</i>	25	-	-
		<i>Ischnura hastata</i>	23	-	-

Source: Primer Data (2018)

Based on the table above, it is known that dragonfly sub-order Anisoptera dominated the number in the three observation zones compared to the sub-order Zygoptera. In the sub-order, Anisoptera consists of 2 families, namely Libellulidae and Chlorocyphidae, which could be found in all observation zones. The family of Libellulidae is the family with the most observed type of dragonfly, there are eight species, namely *Brachydiplax chalybea*, *Brachythemis contaminata*, *Diplacodes trivialis*, *Neurothemis terminata*, *Orthetrum glaucum*, *Orthetrum sabina*, *Pantala flavescens*, *Tholymis tillagra*. The Chlorocyphidae family has only one type of dragonfly, the *Libellago lineata*. In the sub-order Zygoptera there is only one family, namely Coenagrionidae which have three species, namely *Agriocnemis femina*, *Agriocnemis pygmaea*, and *Ischnura hastata* were only found the zone I, the zone closest to the water source/river.

3.5 The dragonfly appearance frequency in three observation times

Morning observations of the dragonfly appearance frequency

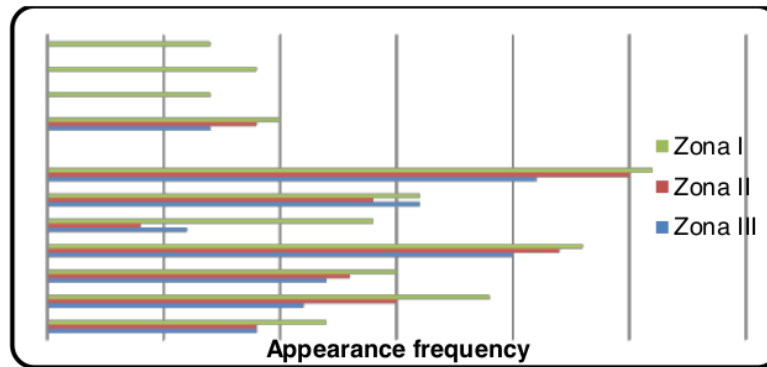


Figure 4. Morning Observation Diagram of the Dragonfly Appearance Frequency

5

Based on the diagram above, it can be seen that in the zone I 11 dragonfly species appeared and in zone II and zone III each of the seven dragonfly species appeared. The frequency of most dragonflies occurring was found in the zone I, which was 158 individuals and the type of dragonfly with the highest number of individuals, namely *Pantala flavescens*. In zone II, there were 111 individuals. The frequency of occurrence of the smallest dragonflies was in zone III, namely 102 individuals and types of dragonflies with the least number of individuals, namely *Agriocnemis femina* and *Ischnura hastata*. Eight types of dragonflies can be found in the three observation zones, namely *Brachydiplax chalybea*, *Brachythemis contaminata*, *Diplacodes trivialis*, *Neurothemis terminata*, *Orthetrum glaucum*, *Orthetrum sabina*, *Pantala flavescens*, and *Libellago lineata*. *Agriocnemis femina* dragonfly, *Agriocnemis pygmaea*, and *Ischnura hastata* were only found in zone I. *Tholymis tillagra* dragonflies were not found in morning observations.

Noon observation of the dragonfly appearance frequency

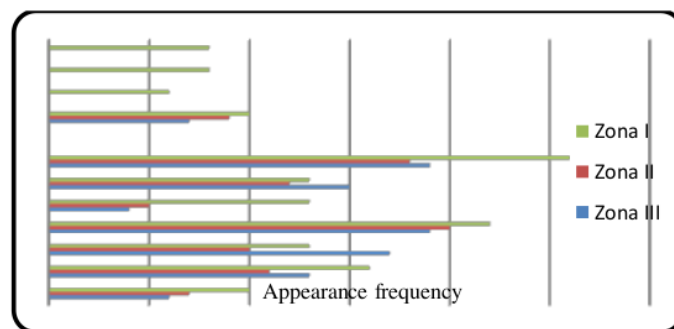


Figure 5. Noon observation of the dragonfly appearance frequency

5

Based on the diagram above, it can be seen that in the zone I 11 dragonfly species appeared and in zone II and zone III each of the seven dragonfly species appeared. The most appearance frequency of dragonflies was found in the zone I, 145 individuals and the type of dragonflies with the highest number of individuals, namely *Pantala flavescens*, while the frequency of occurrence of the smallest

dragonflies was in zone II, 92 individuals and dragonflies with the least number of individuals, *Agriocnemis femina*. In zone III, there were 100 individuals. Eight types of dragonflies could be found in the three observation zones, namely *Brachydiplax chalybea*, *Brachythemis contaminata*, *Diplacodes trivialis*, *Neurothemis terminata*, *Orthetrum glaucum*, *Orthetrum sabina*, *Pantala flavescens*, and *Libellago lineata*. *Agriocnemis femina*, *Agriocnemis pygmaea*, and *Ischnura hastata* dragonfly were only found in zone I. *Tholymis tillagra* dragonflies were not found in noon observations.

Afternoon observations of the dragonfly appearance frequency.

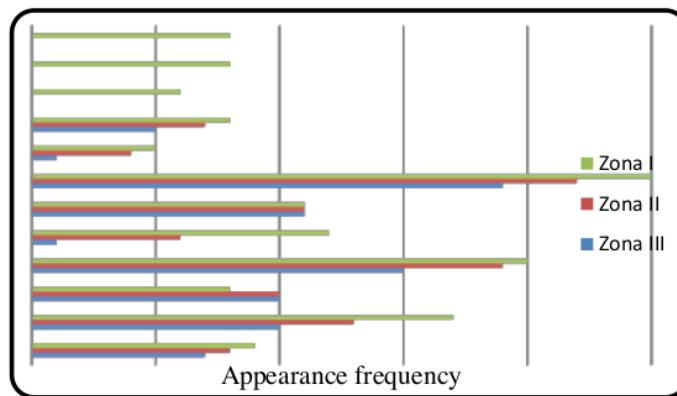


Figure 6. Afternoon Observation Diagram of the Dragonfly Appearance Frequency.

⁵ Based on the diagram above, it can be seen that in the zone I 12 dragonfly species appeared, in zone II and zone III each of the nine dragonfly species appeared. The most appearance frequency of dragonflies was found in the zone I, which was 137 individuals and the type of dragonfly with the highest number of individuals, namely *Pantala flavescens*. In zone II, there were 100 individuals. The least appearance frequency of dragonflies was in zone III, namely 79 individuals and the type of dragonfly with the fewest specific number, namely *Agriocnemis femina*. In zone III, there were 100 individuals. There were nine types of dragonflies which all individuals could be found in the three observation zones, namely *Brachydiplax chalybea*, *Brachythemis contaminata*, *Diplacodes trivialis*, *Neurothemis terminata*, *Orthetrum glaucum*, *Orthetrum sabina*, *Pantala flavescens*, *Tholymis tillagra*, and *Libellago lineata*. *Agriocnemis femina*, *Agriocnemis pygmaea*, and *Ischnura hastata* dragonfly were only found in the zone I and in the afternoon observation.



Figure 7. Large dragonfly photo (Anisoptera sub-order) 1. *Brachydiplax chalybea*, 2. *Brachythemis contaminata*, 3. *Diplacodes trivialis*, 4. *Neurothemis terminata*, 5. *Orthetrum glaucum*, 6. *Orthetrum sabina*, 7. *Pantala flavescens*, 8. *Tholymis tillagra*.

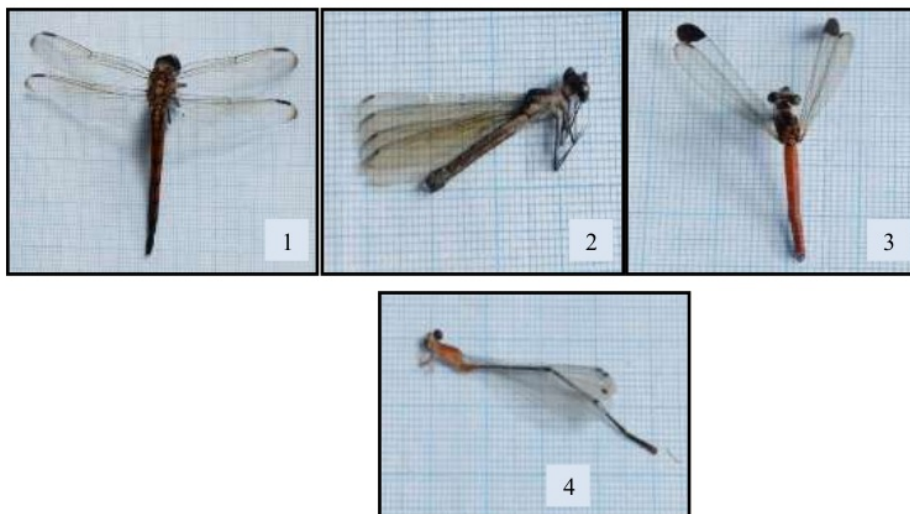


Figure 8. Needle Dragonfly Photo (Zygoptera sub-order) 1. *Libellago lineata*, 2. *Agriocnemis femina*, 3. *Agriocnemis pygmaea*, 4. *Ischnura hastata*.

This morphological research is fundamental to be done to help identify species in particular ecology. The morphological analysis will be constructive if juxtaposed with barcoding studies if finding species that have not been identified. Morphological research has also been carried out on teak[8], mahogany[9], termites[10] and some crabs[11].

4. Conclusions

Based on the results of the research conducted, it can be concluded as follows:

1. Types of dragonflies found around the Mahaka River, Hasanuddin University Education Forest, were 12 types, from sub-orders of Anisoptera which were eight types of the Libellulidae Family and from Zygoptera orders namely one species of the Chlorocyphidae Family and three species of the Coenagrionidae Family.
2. The highest number of dragonflies was in the zone I, and in zones II and III, respectively.
3. The most frequency of dragonfly appearance was found in morning observations, noon and afternoon observation.

References

- [1] Hartika, N F, Diba and Wahdina 2017 Keanekaragaman Jenis Capung (Odonata) pada Ruang Terbuka Hijau Kota Pontianak *J. Hutan Lestari* **5** 156–8
- [2] Fitriana N 2016 Diversitas Capung (Odonata) di Situ Pamulang Kota Tangerang Selatan, Banten. *Pro-life* **3** 228–30
- [3] Hanum S O, Salmah S and Dahelmi 2013 Jenis-jenis Capung (Odonata) di Kawasan Taman Satwa Kandi Kota Sawahlunto , Sumatera Barat Dragonflies species in Kandi Wildlife Park Area , Sawahlunto City , West Sumatra *J. Biol. Univ. Andalas* **2** 71–6
- [4] Azima S E, Syahribulan S, Sjam S and Santosa S 2017 Analisis Keragaman Jenis Serangga Predator Pada Tanaman Padi Di Areal Persawahan Kelurahan Tamalanrea Kota Makassar *Bioma J. Biol. Makassar* **2** 12–8
- [5] Haneda N F and Kusmana C 2013 Keanekaragaman Serangga di Ekosistem Mangrove 42–7
- [6] Susanti S, Djajasmita M and Rasmadi P 1998 *Mengenal capung* (Puslitbang Biologi-LIPI)
- [7] Choate P 2012 Key to some families of Odonata
- [8] Larekeng S H, Gusmiaty, Restu M, Arsyad M A and Dermawan R 2019 Morphophysiological analyses on Teak (*Tectona grandis* Linn. f.) from three provenances *IOP Conf. Ser. Earth Environ. Sci.* **235** 012048
- [9] Larekeng S H, Restu M, Arsyad M A and Mutia 2019 Observation of morphological and physiological characteristics on Abangares Mahogany (*Swietenia macrophylla* King .) In South Sulawesi *IOP Conf. Ser. Earth Environ. Sci.* **270** 012022
- [10] Arif A, Muin M, Larekeng S and Lestari P 2019 Survey and morphological identification of termites (Insecta: Isoptera) in Teaching Forest of Hasanuddin University, Indonesia *IOP Conf. Ser. Earth Environ. Sci.* **270** 012001
- [11] Abbas E M, Abdelsalam K M, Mohammed-Geba K, Ahmed H O and Kato M 2016 Genetic and morphological identification of some crabs from the Gulf of Suez, Northern Red Sea, Egypt *Egypt. J. Aquat. Res.* **42** 319–29

ORIGINALITY REPORT

% **14**
SIMILARITY INDEX

% **10**
INTERNET SOURCES

% **12**
PUBLICATIONS

% **10**
STUDENT PAPERS

PRIMARY SOURCES

1 Submitted to Universitas Hasanuddin % **6**
Student Paper

2 www2.pv.infn.it % **2**
Internet Source

3 digilib.unimed.ac.id % **1**
Internet Source

4 H P Mauliddia, C Muryani, P Rintayati. "Earthcomm-based Electronic Module: The Learning Material of Natural Resource Management Wisdom", IOP Conference Series: Earth and Environmental Science, 2018 % **1**
Publication

5 docplayer.net % **1**
Internet Source

6 Widya Prarikeslan, Dedi Hermon, Yurni Suasti, Aprizon Putra. "Density, coverage and biomass of seagrass ecosystem in the Lobam Island, Bintan Regency - Indonesia", IOP Conference Series: Earth and Environmental Science, 2019 % **1**
Publication

7

H Anggunira, C S Putri, S R Iskandar, B D S Aji et al. " Insects as Pollinator of Koord. Flower in Resort Bandalit, Meru Betiri National Park ", IOP Conference Series: Earth and Environmental Science, 2019

Publication

% 1

8

Yusran, A Sabar. "Internal and External Implementation Strategy of Collaboration Management Model in Hasanuddin University Educational Forest", IOP Conference Series: Earth and Environmental Science, 2019

Publication

<% 1

9

eudl.eu

Internet Source

<% 1

10

S Nuraeni, A Sadapotto, C A Lestari. " Preference and biology of moril bombyx in feed-made mixed red beans () ingredients ", IOP Conference Series: Earth and Environmental Science, 2019

Publication

<% 1

11

U Arsyad, Wahyuni. "The characteristics of infiltration in natural forest in teaching forest of Hasanuddin University University at Maros Regency", IOP Conference Series: Earth and Environmental Science, 2019

Publication

<% 1

EXCLUDE QUOTES ON

EXCLUDE
BIBLIOGRAPHY ON

EXCLUDE MATCHES < 5
WORDS