TRANSPUBLIKA INTERNATIONAL RESEARCH IN EXACT SCIENCES (TIRES)

DIVERSITY OF AQUATIC INSECTS AS AN INDICATOR OF WATER CLEANLINESS IN THE CIRAHAB SERANG-BANTEN WATER SOURCES AREA

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Abstract

This research was carried out in the Cirahab water source area located in Curuggoong Village, Padarincang District, Serang-Banten Regency. This research aims to determine the diversity of insects as an indicator of the cleanliness of the Cirahab source water which is widely used by local communities for bathing, washing and other needs. which of course can affect the existence of these freshwater insects. Hence, the insect samples collected use various equipment, such as buckets, trays, insect tissue, which are taken from the Cirahab water source. The calculation method used is by referring to the formula from Shannon Wiener. The results of calculating the diversity index value obtained a result of 2.63566, this result shows a "Medium" result. Apart from that, there are measurements of water cleanliness, including temperature with a value of 24 mg/l, TDS 45 mg/l, BOD 0.93 mg/l, COD 90,321 mg/l, DO 50 mg/l and water flow of 0.20 m/s.

Keywords: *Cirahab Source, Diversity, Insect*

1. INTRODUCTION

Insects are a group of macroinvertebrates that are mostly found in waters, especially in aquatic waters (fresh water) (Che Salmah & Abu Hassan, 2002). This condition is also indicated by the large number of occurrences, composition and very wide distribution and the ability of insects to adapt to various types of habitats in the aquatic environment (Heino, 2009). This type of insect group is also often found in various places (Muchlisin et al., 2010), for example in rivers, lakes, swamps or waters, especially in the water sources of Cirahab, Serang-Banten.

As such, this type of insect can also be used as an indicator in looking at water quality, whether in terms of water cleanliness, the quality of chemicals, or looking at other polluting factors in the waters (Morse et al., 1994). The presence of insects is certainly very necessary to look at various factors in determining water quality (Merritt & Cummins, 1996). There are several orders that are often found in waters, lakes or rivers, including the orders Plecoptera, ephemeroptera, tricoptera and other orders that are often found in waters (Subramanian & Sivaramakrishnan, 2007). Apart from that, those from the Odonata order and the Colepotera order are found in waters where the water quality is very low or are still heavily polluted by household waste materials or other types of waste in the waters (Southwood & Henderson, 2009).

Nowadays, water quality is certainly experiencing various setbacks due to human activities which throw a lot of rubbish, household waste or industrial waste into rivers excessively and haphazardly, thereby reducing or even destroying water quality (Abdul Hamid & Md Rawi, 2011). There are many changes in these waters, from physical, chemical and biological changes that are dangerous for living creatures in the aquatic environment (Ward et al., 2023). Apart from that, it can also affect the speed of the

current, the presence of plants and even the presence of insects there will decrease (Wardhani, 2007).

The diversity of aquatic insects in aquatic areas is still quite large, especially in waters that are still clean without any polluting human activities, whereas in waters that are polluted due to lots of human activities, insects tend to be few in number compared to waters that are still clean. In conditions of polluted waters, many new populations tend to grow in polluted waters and this will disrupt the existence of insects and ultimately the insect population will thin out.

This research also aims to determine the composition and diversity of aquatic insects in the Cirahab Sumber water area, Serang-Banten, by looking at various human activities there, including holidays, agriculture, development and other changes such as physics, chemistry and biology due to waste entering the waters. This is a result of human activity.

2. RESEARCH METHODS

2.1. Research location

The research was conducted at the Cirahab water source in Curuggoong Village, Padarincang District, Serang-Banten Regency.

2.2. Collecting insects

Insects are collected from various points, using tools such as buckets, trays, nets to collect the insects obtained, this insect collection is carried out at the edges of waters, rock crevices and on plants, the insects obtained are then placed in trays, and then the insects are given alcohol 80 % so that it is not easily damaged.

2.3. Monitoring water cleanliness

This measurement is carried out using water quality parameters, namely pH, DO, turbidity level, TDS and water flow.

2.4. Sample identification

The insects obtained are then sorted according to their order and species, then the insects are identified and recorded.

2.5. Data analysis

The data obtained was then analyzed descriptively in tabular form of the data obtained. Then calculations were carried out using the formula from Shannon Wiener. With the diversity formula as follows:

$$H' = - \sum ni/N \log ni/N$$

Where:
H' = Shannon-Winner Diversity Index
H1 = Number of Individuals of one type of Fish
N = Total number of all individuals
The magnitude of the Shannon-Winner diversity index is as follows:

H' value > 3 = High species diversity
H' value 1 < H' < 3 = Medium diversity
H' value < 1 = Diversity, low safety

3. RESULTS AND DISCUSSION

The results of research carried out in the Cirahab source water area in Curuggoong village, Padarincang sub-district, Serang-Banten regency, obtained results from several types of insect orders, namely from the orders Colepotera, Ephemeroptera, Hemiptera, Lepidoptera, Odonata, Trichoptera, Diptera. The insects in Cirahab source are very varied and of many types, this is because human activities in Cirahab only disturb their presence there, so the insects there are still abundant. Apart from that, insects of course like places with lots of food sources so that the insects can breed well and produce lots of offspring. The species obtained from the various orders above include the following:

Table 1. Insect Collection Results

No	Ordo	Species	Latin Name	Amount
1	*Coleoptera*	Black Beetle	*Oryctes rhinoceros*	8
		Red Beetle	*Pyrrhocoris apetrus*	5
		Green Beetle	*Cotinis nitida*	7
		Fireflies	*Lampyris noctiluca*	10
		Beetle koksi	Harmonia axyridis	9
2	*Ephemeroptera*	Mayflies	-	5
3	*Hemiptera*	Stinging Grasshoper	*Leptocorixa acuta thumb*	2
		Green Ladybug	*Nezara viridula*	1
4	*Lepidoptera*	Butterly	*Appias libythea*	10
		Moth	*Lymantria dispar*	3
5	*Hymenoptera*	Bee	*Apis cerana*	5
		Ant	*Dolichoderus thoracicus*	20
6	*Odonata*	Dragonfly	*Orthetrum sabina*	10
7	*Diptera*	Green Fly	*Lucilia sericata*	5
		Fruit Flies	*Bacteroicera carambolae*	10
		Fly	*Musca domestica*	15
8	*Orthoptera*	Grasshopper	*Dissosteira carolina*	20
	Amount			**145**

The types of insects above are insects found in the Cirahab source waters. These insects are found in various places, both on rocks, soil, leaves and on the banks of the Cirahab source waters. The insects found in the Cirahab source waters are dominated by grasshoppers and black ants which are often found there with a sample size of 20, then there are animals such as butterflies, fireflies, dragonflies and fruit flies with a total of 10 each.

The presence of insects in the cirahab source area is starting to be small because there has been a lot of human activity now. Usually, insects such as butterflies and dragonflies dominate their presence there, because there are lots of wild flowers that grow there, but now wild flowers rarely grow so there is a reduction in the number of butterflies or insects that like flowers there, apart from butterflies. Bees are also rarely seen.

Clean water quality in waters will indicate the number of insects that live around those waters, and whereas in polluted waters the insects that live there will tend to be few, and only certain animals can live in polluted waters. Cirahab source waters are waters with a very low level of pollution, because human activity tends to be less, besides that these waters still have the characteristics of insects that live there which are still quite numerous, such as butterflies, dragonflies, ants, fireflies at night and other insects. Many others still live in the Cirahab source area.

There is some polluted waste resulting from human activities, including detergent soap, bath soap foam, and plastic waste. This pollution is also very disturbing to the aquatic ecosystem in Cirahab. These factors will also certainly disrupt the quality or cleanliness of the water in the Cirahab source area. The results of measuring cleanliness or water quality include the following:

Table 2. Water Cleanliness Parameter Measurement Results

No	Parameter	Methods	Unit	Result
1	Temperature	Thermometer	mg/l	24
2	TDS	TDS Meters	mg/l	45
3	BOD	Winkter	mg/l	0.93
4	COD	Refluk	mg/l	90.321
5	DO	DO Meters	mg/l	5.0
6	Waters flow speed	-	m/s	0.20

The results of the table above are the results of measurements for the quality of water cleanliness in the Cirahab source area. These measurements include measurements of water temperature, TDS, BOD, COD, DO and water flow speed. Of course, there will be more insects in the water if the water is clean and protected from dangerous contamination. Of course, water quality or water cleanliness must also be measured so that the level of contamination of the water can be known.

Apart from measurements, of course, this research also uses calculations from the Shannon Wiener diversity formula, the results of which can be seen in Table 3 below:

Table 3. Calculation Results Shannon Wiener

No	Ordo	Species	Latin Name	Amount	Diversity Value Shannon Wiener
1	*Coleoptera*	Black Beetle	*Oryctes rhinoceros*	8	-0.15985
		Red Beetle	*Pyrrhocoris apetrus*	5	-0.11611
		Green Beetle	*Cotinis nitida*	7	-0.14632
		Fireflies	*Lampyris noctiluca*	10	-0.18442
		Beetle koksi	Harmonia axyridis	9	-0.17252
2	*Ephemeroptera*	Mayflies	-	5	-0.11611
3	*Hemiptera*	Stinging Grasshopper	*Leptocorixa acuta thumb*	2	-0.05908
		Green Ladybug	*Nezara viridula*	1	-0.03432
4	*Lepidoptera*	Butterfly	*Appias libythea*	10	-0.18442
		Green fly	*Lymantria dispar*	3	-0.08024
5	*Hymenoptera*	Bee	*Apis cerana*	5	-0.11611
		Ant	*Dolichoderus thoracicus*	20	-0.27324
6	*Odonata*	Dragonfly	*Orthetrum sabina*	10	-0.18442
7	*Diptera*	Green fly	*Lucilia sericata*	5	-0.11611
		Fruit fly	*Bacteroicera carambolae*	10	-0.18442
		fly	*Musca domestica*	15	-0.23469
8	*Orthoptera*	Grasshopper	*Dissosteira carolina*	20	-0.27324
Amount				**145**	**2.63566**

From the table 3, the results obtained from calculations using the Shannon Wiener formula obtained results with a value of 2.63566, which shows that the insect diversity index found in the Cirahab source area shows "Medium". This proves that there are still quite a lot of insects at the source of the Cirahab, and the level of pollution in the area is still relatively low.

4. CONCLUSION

From the results of this research, it was found that there are still quite a lot of insects found in the Cirahab source. Apart from that, the insects in the Cirahab are dominated by ants and grasshoppers, with the largest number, the second insect is dominated by butterflies, dragonflies and fireflies. firefly. The calculation method uses the Shannon Wiener formula with a value of 2.63566 which shows a "Medium" result. The insects in the Cirahab water source area are insects that are still dominant and the diversity within them is still abundant, and their distribution is still wide. Therefore, there is a need for further review and research in order to maintain and understand the diversity of insects in the Cirahab.

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