

## The Diversity of Water Environment Gastropoda in The Water of Empayang-Kasap River in Lahat Regency South Sumatra

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### ABSTRAK

Penelitian yang berjudul Keanekaragaman Gastropoda Pada Lingkungan Perairan Sungai Empayang Kabupaten Lahat Provinsi Sumatera Selatan ini bertujuan untuk mengetahui keanekaragaman jenis gastropoda yang terdapat dikawasan tersebut. Penelitian ini di laksanakan pada bulan oktober 2015, bertempat di kasawan sungai Empayang Kasap Desa Sukajadi Kabupaten Lahat. Metode Penelitian penentuan lokasi sampling adalah metode *purposive random sampling* dengan 5 stasiun pengambilan sampel, setiap stasiun dibagi menjadi 3 substasiun (bagian tepi 1, tengah, tepi 2) ditentukan dengan transek garis (*line transect*). Pengambilan sampel menggunakan waktu yaitu pagi dan sore. Hasil penelitian ini diperoleh 8 spesies gastropoda (*Melanoides granifera*, *Elimia acuta*, *Brotia tetidinaria*, *Lymnae stagnalist*, *Lymnae rubiginosa*, *Pomacea canaliculata*, *Pila polita* dan *Menetus sp*) dengan 7 genus, dan dari 6 suku (famili) dari 4 ordo. Indeks keanekaragaman rata-rata di kawasan sungai Empayang Kasap Sukajadi Kabupaten Lahat adalah sedang dengan kisaran 2,09-2,46. Tingkat keanekaragaman tertinggi terdapat pada stasiun V (2,46) dan terendah pada stasiun I (2,09). Sedangkan nilai dari indeks dominansi (C) dengan kisaran 0,17-0,26 di 5 stasiun dalam keadaan rendah, tingkat indeks dominansi tertinggi pada stasiun I (0,26) dan terendah pada stasiun III (0,17). Kondisi kualitas perairan sungai sangat mempengaruhi keberadaan gastropoda.

**Kata kunci** : Sungai Empayang Kasap, Gastropoda, Keanekaragaman

### ABSTRACT

This research has been conducted with the tittle the diversity of gastropods on the river water environment Empayang Lahat regency of South Sumatra province. The aim of this research species diversity of gastropods contained the region. This research was implemented conducted in October 2015, a river Empayang Kasap Sukajadi Lahat regency. The methods of this research are purposive random sampling method with 5 sampling stations, each station is divided into three substations (edges first, middle, edge two) was determined by line transect. The data of the sample were taken in the morning and afternoon. The results of this research were obtained 8 species of gastropods (*Melanoides granifera*, *Elimia acuta*, *Brotia tetidinaria*, *Lymnae stagnalist*, *Lymnae rubiginosa*, *Pomacea canaliculata*, *Pila polita* and *Menetus sp*) with 7 genera, and of the six tribes (families) of 4 orders. The total index of the diversity in the river Empayang Kasap Sukajadi Lahat district was off 2.09 to 2.46. The highest levels of diversity found in the station V (2.46) and the lowest at the station I (2.09). While the value of dominance index (C) with a range of 0.17 to 0.26 at five stations in the lower state, the highest level of dominance index at station I (0.26) and the lowest at station III (0.17). River water quality conditions greatly affect the existence of gastropods.

**Keywords:** Empayang Kasap River, Gastropods, Diversity

## INTRODUCTION

Empayang Kasap river in the village of Sukajadi, located in the District of Pseksu Lahat regency. Lahat regency is geographically, Lahat regency is located located between 3,250- 4,150 south latitude and 102.370 east longitude (Lankip Lahat, 2013). Empayang Kasap river flow towards the flow of the river Musi. Empayang Kasap river water flow coming from the Bukit Barisan mountains at an altitude of 1,700 meters and  $\pm$  sharply decreased to  $\pm$  400 meters at a distance of 60 km from the river Musi.

Characteristics of the river Empayang Kasap which has a sinuous shape, type of dendritic drainage network, the river often eroded. Empayang Kasap River has a characteristic typical floodplain ecosystem, the river is experiencing the deep water and shallow water (Mulyanto, 2007). When the rainy season comes it is often the outskirts of river sediments and rocks carried by currents, rivers and streams make debit and currents flowing. Whereas in the summer rather shallow because the supply flow of water from the hills a bit.

Rivers in Indonesia has a multipurpose nature (Rakhmanda, 2011), with a range of activities carried out on the river ranging from household, farming, agriculture, transport, industry and livestock (Amdani, 2001; Mulyanto, 2007). Use of the river Empayang Kasap unwittingly lowered water quality due to a variety of local community activities. According (Widaningroem, 2010 ; Emilia, 2013) all activities from community activities will be the cause of the increased amount of waste or pollution. Loss of quality due to pollutants in the river waters becomes a source of problems for the life aquatic organisms.

Rivers has an ecosystem made up of biotic and abiotic components. If one component is disrupted ecosystems will lead to instability in the ecosystem of the river. Organisms in river waters are quite sensitive to environmental influences in the river waters are macrozoobenthos. According Putro (2014), macrozoobenthos an aquatic organism basis either in the form of animals or plants, (Lubis, 2013) macrozoobenthos can live on the surface and bottom waters. Aquatic environments as a habitat for living macrozoobenthos determine the presence, quantity and diversity according to water conditions (Astra, 2009; Lubis, 2013). Diversity macrozoobenthos have the ability to respond to the water quality continuously, so that the organism (Zulkifli *et al.*, 2011) is often used as an indicator of ecological disturbance in a body of water especially rivers.

Macrozoobenthos organism composed of mollusk and crustaceans. Mollusk often found in river waters is a gastropod. Gastropods are a class that has the number of members of the highest and most successful because it controls a wide range of habitats life (Barnes, 1987). Gastropods commonly known as slugs or snails. Most forms of asymmetric gastropod class because of the torque. According Rakhmanda (2011) is generally conical snail shell or a cone from a circular tube. Generally freshwater gastropods are herbivores, but some are carnivores, mostly a dendritic eater, moss and various algae. Gastropods fresh water used for human consumption and animal feed as well as animals and ducks (Meria, 2010), but there are also several types of freshwater gastropods become an intermediate host host termatoda parasitic worms.

Viewed gastropods ability to survive in different habitats, especially freshwater like rivers and have the ability to become a bio-indicators of the environment, hence the need to know the kind of diversity of gastropod in the river Empayang Kasap. Kasap Empayang river that is always used by the local community can affect the water quality, for it is necessary to study the level of gastropod species diversity in the area. This study was conducted to determine the diversity of gastropods on the river water environment Empayang Kasap Sukajadi Lahat regency.

## MATERIALS AND METHODS

This research was conducted from October-November 2015, the study was conducted in the area of the river Empayang Kasap Sukajadi Lahat regency. The method used in this research is descriptive method (quantitative and qualitative) with a sampling technique that survey and observation. Determining the location of sampling using purposive random sampling at 5 observation stations, with each station is divided into three substations (edges first, middle, edge two) was determined by linear transects (line transect). Sampling was done by using a gastropod modified researcher, shovels and sieves. While the tool used to measure the physical and chemical properties and biological river: thermometer, pieces secchi, pole length, plastic bottles, nylon thread, ball pimpong, paper labels, laces rapia, trays, Icebox, stpwatch, wipes, buckets, scoop, shovel, tanggok, nets, tweezers, needle bulb, white cardboard paper, gloves, plastic bags, slotif, scissors, cameras and stationery. Substances used to preserve gastropods: formalin, 70% alcohol, distilled water.

Gastropod samples were taken three (3) repetitions at each station for 1 month. Results of sampling gastropods down to the laboratory for identification. Gastropod biodiversity data analysis using diversity index (H) or Shannon-Wiener index and dominance in the analysis using the using the dominance index (C) or an index Simpson. Chemical analysis of water in doing UPTB Laboratory Environment Agency (BLH) South Sumatra Province. Here is a sampling sites:

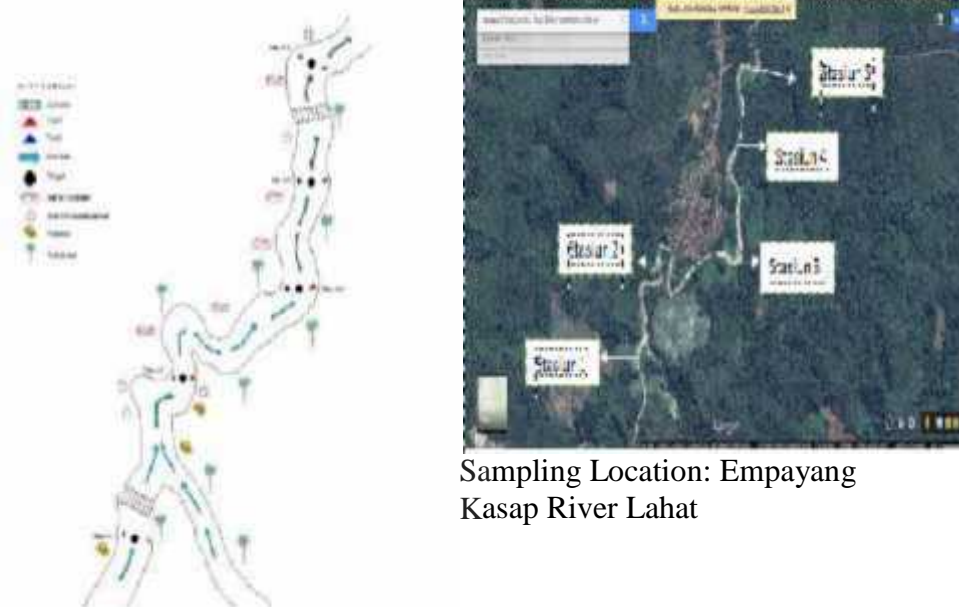


Figure. 1. Map of 5 (five) sampling stations on the Empayang Kasap river

## RESULTS AND DISCUSSION

This research was conducted in 5 (five) stations on the river waters Empayang Kasap obtained the total number of individuals as much as 283 individuals. Gastropods were found (Table 1) by 8 species belonging to the 4th order (Sorbeoconcha, Hygrophila, Mesogastropoda, and Basogastropoda), and gastropods were found to have 6 families (Thiaridae, Pleuroceridae, Pachychilidae, Lymnaeoidae, ampullaridae, and Menetidae), as well as has 7 genre (Melanoides, Elimia, Brotia, Lymnae, Pomaceae, Pila, and Menetus).

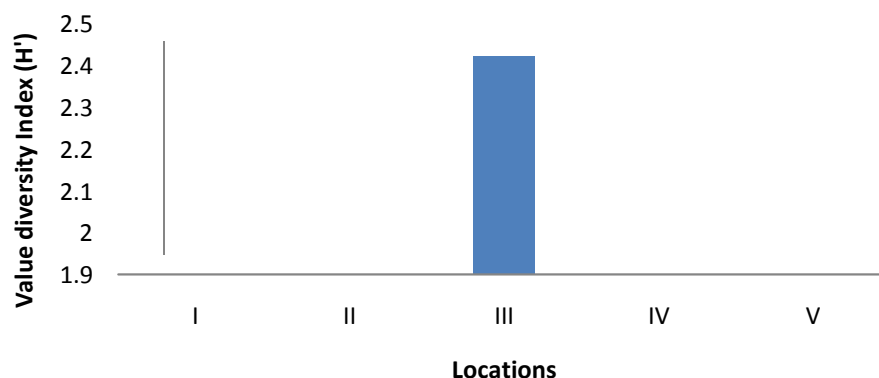


Figure 2. Diversity Index Values gastropods

The results of the study (Table 1) at 5 stations in the river area Empayang Kasap founded 8 species namely: *Melanoides granifera*, *Elimia acuta*, *Brotia tetudinaria*, *Lymnae stagnalist*, *Lymnae rubiginosa*, *Pomecea canaliculata*, *Pila polita* and *Menetus sp.* Stations had a value of diversity index ( $H'$ ) is highest at station V compared with the four other stations (Figure 2). Diversity in the river Empayang Kasap (Table 1) have an average index of the diversity ( $H'$ ) range of moderate (2.09 to 2.46) in accordance with (Odum, 1971) categories Shannon-Wiener index value that the value  $H' > 3$  then the diversity entered the category of being. The level of diversity is highest at station V (2.46) while the lower level of diversity that are at the station I (2.09).

Table.1. Diversity and Dominance Species Gastropod in Empayang Kasap River

No	Taksa	Amount of Individuals at Locations					Total
		I	II	III	IV	V	
Gastropoda							
1.	<i>Melanoides granifera</i>	14	20	9	13	8	64
2.	<i>Elimia acuta</i>	14	21	4	9	4	52
3.	<i>Brotia Tetudinaria</i>	4	1	11	4	8	28
4.	<i>Lymnae stagnalist</i>	12	19	12	26	10	79
5.	<i>Lymnae rubiginosa</i>	1	15	4	11	5	36
6.	<i>Pomecea canaliculata</i>	0	5	10	0	3	18
7.	<i>Pila polita</i>	0	0	0	1	0	1
8.	<i>Menetus sp.</i>	1	0	2	2	0	5
		46	81	52	66	38	283
	Species	6	6	7	7	6	8
	$H'$ (Diversity Indeks)	2,09	2,15	2,42	2,30	2,46	2,54
	C (Dominance Indeks)	0,26	0,18	0,17	0,24	0,19	1,02

Information:

- Station I : Sukajadi Village Upstream
- Station II : Urban Center Residents Lubuk Tama River
- Station III : Sukajadi Village downstream Lubuk Panjang River
- Station IV : Talang Tinggi Village Lubuk Mekam River
- Station V : Talang Tinggi Village and the village Batu Niding Crossing Bridges

The results of the data analysis showed that the diversity of the Empayang Kasap river at station V with a diversity index ( $H'$ ) is the highest of the four other stations are downstream of the river there is a possibility was there were not too many of the utilization of waste streams. This is because the waste from upstream rivers run into the deposition at stations II, III, and IV that does have value diversity index lower. At station V there are species that dominate *Lymnae stagnalist* of the order Hygrophila.

Gastropods study also analyzed data for dominance index (C), which is obtained with a value range of 0.17 to 0.26, the dominance index on the river Empayang Kasap there are no species dominates. The species most commonly found are species *Lymnaea stagnalis* of the order Hygrophila and species of the least discovered that species *Pila polita* of the order Mesogastropoda whose presence can be pressed because of the presence of species *Pomacea canaliculata* as snail pests that today almost found in all types of waters (Marwoto *et al.*, 2011).

The state of a body of water as the habitat can affect the existence of gastropods, diversity index results (Figure 2) at 5 stations on the river Empayang Kasap through the quality of its waters. High and low values of the diversity index (H') and dominance index (C) shows that the use of the river Empayang Kasap still within reasonable limits, but does not guarantee that a current condition of the river is still able to collect waste from various community activities. A community has a high diversity if the community is composed of many types with an abundance of the same type (Purnama *et al.*, 2011).

Gastropods included animals that can menyesuaikan themselves to live in some places and the weather (Barnes, 1987). Marine environment in the river Empayang Kasap influenced by the activity around the river, so that the environmental conditions are influenced by environmental factors that may affect the presence of gastropods. The measurement results of physical and chemical factors (Table 2) showed no change in water quality. Gastropods are at the station V collected at the end of the river to get the amount of organic material and a source of food prior to the upstream, as well as to reach in the upstream areas they must pass through the speed of water flow. Gastropods have the ability to stick and attached below or behind the rocks (Putro, 2014) so that these animals have a suitable habitat at station V.

**Table 2. Results Measurement of Environmental Factors Empayang Kasap River**

Environmental Factor	Decision of the station					Criteria for Water Quality Based class II (pergub no. 16 of 2005)
	I	II	III	IV	V	
<b>Physical</b>						
Flow Speed (m/s)	0,33	0,29	0,37	0,27	0,39	-
Depth (cm)	32,34	33,56	21,22	37	31,78	-
Brightness (cm)	23,11	26,89	17,89	36,67	27,77	-
Temperature (°C)	25,9	26,44	26,22	26,77	26,67	-
Long of River (m)	200	400	500	400	300	-
Width of River (m)	7,90	7,20	6,90	11,2	7,8	-
<b>Kimia</b>						
pH (unit)	6,30	6,85	6,43	6,48	6,56	6-9
DO (mg/L)	6,04	6,10	6,27	6,27	6,25	6
BOD (mg/L)	1,54	1,53	1,57	1,87	1,52	2
COD (mg/L)	7,73	7,82	6,33	7,65	8,66	10
Ammonia (mg/L)	0,007	0,004	0,012	0,007	0,133	0,5
phosphate (mg/L)	1,1	0,6	0,37	0,47	0,27	0,2

Information:

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River situation Empayang Kasap speed fairly strong current at 5 stations (Table 2) with the base substrate of gravel, rocks and sand which allows for animals such as gastropods to survive by clinging and buried in the base substrate waters with properties settled (Harold *et al.*, 2010). Based on the results (Table 2) measurement of environmental



factors Empayang Kasap river at 5 observation stations are not so indicate their relative differences and the same and can be tolerated for the survival of living beings. However, each component of the environment affects the existence of diversity of gastropods.

Environmental factors Empayang Kasap river which is above the threshold, namely the content of Dissolved Oxygen (DO) in the range (6.04 to 6.27). In the waters of the river when the DO content is above the threshold, then it can cause the organisms present in the water will experience a shortage of oxygen levels even death (Hidayat, 2011) which is supposed to be based on the criteria of class II water quality standards should be 6. While the content of phosphate in the range of ( 0.27 to 1.1) should be based on the criteria of class II water quality standards should be 0.2. Phosphate content are exceeding the threshold due to the amount of agricultural waste, fecal population, food waste, and materials detergents containing phosphates into the water will affect the balance of the ecosystem.

## CONCLUSION

Based on the research results can be made the following conclusion:

1. Research gastropod in the river Empayang Kasap Sukajadi Lahat regency in 5 research station obtained a total of 283 individuals as individuals with 8 species of gastropods (Melanoides granifera, Elimia acuta, Brotia tetidinaria, Lymnae stagnalist, Lymnae rubiginosa, Pomacea canaliculata, Pila polita and Menetus sp) , of the 4th order (Sorbeoconcha, Hygrophila, Mesogastropoda, and Basogastropoda), 6 families (Thiaridae, Pleuroceridae, Pachychilidae, Lymnaeoidae, ampullaridae, and Menetidae), and 7 genus (Melanoides, Elimia, Brotia, Lymnae, Pomaceae, Pila, and Menetus ).
2. The value of diversity index ( $H'$ ) river Kasap Having Empayang average index being with values between 2.09 to 2.46. The highest levels of diversity in station V and the lowest at station I. While the value of dominance index (C) of about 0.17 to 0.26 indicates that the absence of the kind that mendominasi.
3. Generally, the condition of the river Empayang Kasap can still be used as a support for habitat gastropods. But the condition of the river (phosphate and DO) can disrupt ecosystems if the river environment constantly put into it wastes resources.

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