Biodiversity in Swamp Ecosystem in Sukamaju Village, Malind District, Merauke Regency, South Papua Province, Indonesia

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ABSTRACT

Background: The level of diversity has a crucial role in the stability of the ecosystem. The higher the variety, the more stable an ecosystem, including agricultural land cultivated by farmers. Increasing of population affected the higher demanding of community towards their consumption activities. Especially, the natural resources that comes from local area such as Sukamaju District. Biodiversity of resources urgently needed to preserve the ecosystems meanwhile being the potential source to fulfilled nourishment of the people. This study aims to determine the diversity of peatland ecosystems by using a purposive sampling method in every selection of subject groups based on the characteristics or characteristics of a specific population.

Methods: Field and Laboratory activities are needed in this research. Sample collection using several methods according to the targeted sample. Most of the sample using purposive sampling but also line intercept transect method. Fish sampling used a fishing gear called a gill net with a mesh size of 2-7 inches. The fish caught is placed in a labeled coolbox. Insect collection was running in the morning at 07.00-11.00 and in the afternoon at 3-5 pm (UTC+09:00). Sampling is held once a month for three months at predetermined coordinate points. Diversity was analyzed using Shannon-Wienner diversity, evenness index, dominance index and intensity on peatlands.

Result: The results found seven orders and 30 families, with a total population of 1,231 individuals. The most dominant types of insects are the orders Coleoptera, Hemiptera and Lepidoptera. High diversity index (H′=3.021), high evenness index (E=0.86243) and low dominance index (D=0.3101). Fish community structure obtained diversity index (H′) included in the medium category, for uniformity values in the high class and dominance index values in the low sort. The dominant fish species found were *Channa striata, Anabas testudineus, Lates calcalifer, Mugil cephalus, Plotosus papuensis* and *Toxotes chataerus,* while *Oreochromis niloticus, Oreochromis mossambicus, Hexanematichthys sagor* and *Megalops cyprinoides*. While the types of molluscs found to have the highest abundance were *Pila ampullacea, Pomacea canaliculata* and *Pilsbryoconcha exilis.*

Key words: Biodiversity, Fish, Insects, Merauke, Molluscs, Peat.

INTRODUCTION

Tropical peatlands have the most environmental biodiversity but are among the most threatened ecosystems. Protection of the natural environment is one of the prime focus for preservation and conservation of living species. Unfortunately, throughout the World, ecosystems are continuously altered by human activities (Mudoi, 2022). Wetlands are a valuable natural resource. They are areas of land that are covered in water, either temporarily or permanently. This means that a wetland is neither truly aquatic nor truly terrestrial; depending on seasonal variability, wetlands may be both at the same time (2022). Large peat deposits in Southeast Asia have formed beneath rich tropical rainforests. These forests support various flora and fauna, including many globally endangered species. Tropical peatlands also provide essential ecosystems that benefit local and international communities, including flood and fire prevention, carbon sequestration and storage, provision of timber and non-timber forest products and cultural and spiritual well-being (Harrison *et al*., 2018). The relationship between biodiversity in peatlands interacts and influences one another (Graham, 2013); it can see how biodiversity responds to human presence/disturbance

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(Yule, 2010) and how vital conservation management interventions are in sustainable agriculture (Blackham *et al*., 2014). Different agricultural practices cause shift in habitat quality resulting in changes in abundance of soil faunal diversity (Akilan and Nanthakumar, 2017). Some insects depend on rice plants around peatlands, such as pests, others as predators and some as parasitoids (Mahmudah *et al*., 2018). In addition, around the paddy field ecosystem, there are usually many other types of animals, like fish species, especially the paddy fields around peat swamps.

Active swamps are by diverse biodiversity, especially mosses, fish, plants and arthropods. Some existing plants, reeds, form their vegetation. Peatland vegetation provides ecosystem protection (Littlewood *et al*., 2010). Peatlands are rich in invertebrate species that have a role in breaking down plant litter. Biodiversity under peat or soil can affect changes in vegetation. The level of diversity of Arthropod species has a crucial role in the stability of the ecosystem. The higher the variety, the more stable an ecosystem, including agricultural land cultivated by farmers or around agriculture. Insect diversity accounts for a large part of all the biodiversity on this earth (Sheela *et al*., 2021).

We Analyzed fish community structure through several ecological indices, including diversity, uniformity and dominance indexes. The diversity index is considered species heterogeneity and is a characteristic of community structure. Uniformity or balance is the composition of the individuals of each species in a community. At the same time dominance index is the ratio of the number of individuals in a species to the total amount of individuals of all species (Khouw, 2009). Based on the description above, it is vital to identify the abundance and diversity of species so organisms' roles in the environment can be identified (Lavelle *et al*., 2006; Turnbe *et al*., 2010). This study aims to obtain information about biodiversity in swamp ecosystems as a basis for mapping biodiversity.

MATERIALS AND METHODS

The research was held in Sukamaju Village, Malind District, Merauke Regency, South Papua Province, with two observation stations for six months start in November 2022. The method used in this research is descriptive method through survey techniques. The descriptive method aims to define systematically, factually and accurately the facts, nature and relationships between the investigated phenomena (Sugiyono, 2012). Primary data was obtained from the main source directly at the research location, the recording results of field observations and documentation during field activities. Secondary data collection was taken from literature related to research and data from related agencies. The materials we using in this study such as Quadrant 1×1 m, GPS, Fishing Gear (gill net 2 until 7 inches), insects trap, alcohol 70% and 98%, sample plastic/clip paper, paper tagging, cameras, thermometer, pH indicators, fish, mollusc and insect. Further sample analysis conducted in Agrotechnology Laboratory and Aquatic Resources Management Laboraroty at Agriculture Faculty, Musamus University. The details for sampling are explained as follows:

Sampling method

We collected samples using Line an Intercept Transect and Quadrant 1×1 m. The sampling site determines through a purposive sampling method in which the subject group is categorized on the species' characteristics or a particular population's character. Purposive sampling differs from random sampling (not taking samples randomly but based on specific considerations deliberately).

a. Fish sampling

Fish sampling was carried out using gill net fishing gear with a mesh size of 2-7 inches (Allen *et al.*, 2000). Then, the caught fish were stored in a coolbox which was well labeled (Allen *et al.*, 2008). The collected fish continue to further identification using an identification book according to Allen, (1991), Carpenter and Niem (2001) and Kuiter and Tonozuka (2001), at the Aquatic Resources Management Laboratory, Faculty of Agriculture, Musamus University. Fish sampling was done once a month for three months.

b. Mollusc sampling

Mollusc sampling was conducted using a quadrant measuring 1×1 m. The sampling location was divided into Station I and Station II. Each Station has placed ten quadrants. The sampling was carried out thrice for three months, so the total of sampling quadrants was 60 quadrants. The successful sample obtained continued further identified at the Aquatic Resources Management Laboratory, Faculty of Agriculture, Musamus University using identification books Dance (1974), Dharma (1988, 2005) and various trusted websites such as WoRMs and molluscabase.org.

c. Insect sampling

Insect collection was held in the morning at 07.00-11.00 and in the afternoon at 15.00-17.00 WITA. The insect sampling procedure was performed with the following steps: (i). We were catching insects with insect nets by swinging the net where there were insects. (ii). Catching insects with yellow traps. The identification step was carried out at the Musamus University Agrotechnology Laboratory with an identification book.

Processing and data analysis

Data collection is obtained in two ways, namely, primary and secondary data. Preliminary data were using direct observation of the peat area to be collected. Furthermore, secondary data is from related offices or agencies in the research area. The data that has been collected is analyzed descriptively and presented in the form of tables and figures.

Diversity index (Shannon-Wiener)

Species diversity is calculated using the Shanon-Wiener Odum diversity index (1971) in Sirait *et al.* (2018) with the formula:

$$H' = -\Sigma(Pi)\ (LnPi)$$

Where,

H′= Shannon-wiener diversity index.

Pi = Number of individuals of a species/total number of all species.

ni = Number of individuals of the i-th species.

N = Total number of individuals.

Ln = Natural logarithm.

Diversity index criteria (H') according to Shannor-Weaver in Merly *et al.* (2022).	
H' < 1.0	Diversity low
1.0 < H < 3.0	Diversity mid
H' > 3.0	Diversity high

Evenness index (index of evenness) (Population)

The type evenness index value can describe the stability of a community. Calculated using the species evenness index (evenness) with the formula used, namely:

$$E = \frac{H'}{LnS}$$

Where,

E = Evenness index of species.

H′ = Species diversity index.

S = Number of types.

Ln = Natural Logarithm.

Ismaini *et al.* (2015) state the criteria for the E range as follows:	
E < 0.4	Small population eveness and depressed community
0.4 < E < 0.6	Moderate population eveness and labile community
E > 0.6	High population eveness and stable community

Dominance index (Simpsom)

The dominance index value of each insect pest group is calculated using the formula:

$$C = \Sigma Pi^2 \quad \text{Where} \quad Pi = \frac{ni}{N}$$

Where,

C= Simpsom dominance index.

ni= Number of individuals of one kind.

N= Number of individuals of all species.

The level of insect dominance can be characterized based on the Simpson dominance index criteria as follows:	
C < 0.50	Low dominance
0.5 < C < 0.75	Mid dominance
0.75 < C < 1	High dominance

RESULTS AND DISCUSSION

Insects are the most dominant species on the earth with number of known species exceeding over a million (Harish, 2018). The study's results found 7 orders and 30 families, with a population of 1,231. The most dominant types of insects are the orders Coleoptera, Hemiptera and Lepidoptera. High diversity index (H′=3.021), high evenness index (E=0.86243) and low dominance index (D=0.3101) (Table 1). The types of Lepidoptera, Diptera and Hemiptera are majority found around rice fields. Usually, Lepidoptera and Hemiptera are many pests on plants (Emani, 2018).

Agricultural practices on peatlands require lowering the groundwater level so that plants can grow (Qurani *et al.*, 2022). The use of peat around Sukamaju village, Malind District and its surroundings for crops dramatically affects the composition of arthropods (Fasla, 2021) and biodiversity. This agricultural activity is mainly due to chemical fertilizers and pesticides (Meidalima *et al.*, 2018). The causes of loss of peatland biodiversity are habitat loss, invasion of foreign species, over-exploitation for agriculture, forestry and peat extraction, nutrient pollution and climate change. These arthropods are active in finding food and carrying out reproductive activities. These organisms have a specific time range and temperature for actions during the day to survive (the lowest temperature or highest temperature) (Susanto, 2000). The first record of insect existence came from the Devonian period (*i.e.* 500 million years ago). The first flying insect was traced to the carboniferous period (*i.e.* 354 to 295 million years ago). The insects can occupy new habitats and niches where other species cannot occupy by through their unique ability of flight (Sujayanand *et al.*, 2016).

Natural diversity in rice fields has become important for the community (Freed *et al.*, 2021). Planting rice varieties are that resistant to types is one of the main obstacles to suppressing pest attacks (Lestari *et al.*, 2020). Apart from that, people also demand according to their tastes (Hidayatun *et al.*, 2021). The most common types of insects found are from the Diptera order (Tephritidae), which is one of the pests (Aryoudi *et al.*, 2015), detrimental to the cultivation of fruit trees (Ginting, 2007). The high amount of Diptera exists due to the diverse vegetation of various plants such as bananas, papayas, bird's eye chilies, eggplants, tomatoes, beans and vegetables which can be the host plants. The diversity of vegetation types significantly contributes to arthropods' existence because arthropods will spend half of their life cycle in a habitat that can provide an optimal amount of food sources as needed (Kautsar and Alvin, 2015). Coleopteran playing a fundamental ecological role in all type of ecosystems, accounts for 38% of entire insects and about 387,100 species of the Coleopteran are known to exist in the world (Meena and Kumari, 2023).

Organic farming increases site biodiversity in rice plantations (Lorenzon *et al.*, 2020); besides, the type of plant or weed will affect insect diversity (Amarullah *et al.*, 2017) (Pallot *et al.*, 2005). The abundance of species in insects is determined by their reproductive activities, which bolster by suitable areas and meet the needs of food sources (Hutasuhut *et al*., 2017). The beneficial insect such predators and parasitoids play crucial role in the agricultural ecosystem by diminishing insect pest populations in the field (Roy, 2023). Insects such as bees (Trigona spinipes) (Banik *et al*., 2023), butterflies (Nisoniades macarius) and beetles (Pristimerus calcaratus) have been noted to visit flowering plants frequently (Hamdan *et al*., 2022). Diversified pollinators maintain the resilience and stability of ecosystems. The diversity in pollinators abundance acts in such a manner that when one pollinator species declines or faces challenges, other species may step in and continue the vital pollination services, minimizing the impact on plant reproduction and ecosystem functioning (Padhy, 2023). Insect population fluctuations generally show the same trend between different insects, but at the end of the planting season, there is a significant increase, especially in herbivorous insects (Afifah *et al*., 2020). Natural enemies, predators and pest parasitoids intercept pest densities below the economic threshold level. It can be functioned as a biological control agent for dangerous species (Wiranto *et al*., 2021).

Arthropods from the Arachnida class, order Araneae found at night totaled 2.3 individuals whose species are unknown. Spiders (arachnids) have an essential role as predators, mainly preying on insects, thus playing a role in controlling pest populations (Samu *et al*., 2014), while the trapped isopod order is 4.0 individuals (Normasari, 2012). Predatory arthropods can potentially prevent crop damage from reaching economic levels in agroecosystems. This is because they contribute to the delay in pest population build up as a result of diverse interactions with pest populations (Wahab *et al*., 2020).

Table 1: Arthropod population in Sukamaju village.

Order	Family	Species
Coleoptera	Chrysomelidae	*Aulacophora indica*
	Chrysomelidae	*Chrysochus cobaltinus*
	Lycidae	*Erotides sp.*
	Phalacridae	*Acylomus*
	Tenebrionidae	*Amarygmus*
	Coccinelidae	*Brachiacantha*
	Carabidae	*Cicindela punctulata*
	Staphylinidae	*Paederus dermatitis*
Diptera	Agromyzidae	*Ophiomyia phaseoli*
	Calliphoridae	*lucilia sericata*
	Muscidae	*Atherigona exigua*
	Stratiomyidae	*Hermetia illucens*
	Tephritidae	*B. dorsalis*
	Dolichopodidae	*Condylostylus sipho*
Hemiptera	Alydidae	*Leptocorisa acuta*
	Delphacidae	*Nilaparvata lugens*
	Cicadellidae	*Nephotettix virescens*
	Mesovelliidae	*Mesovelia vittigera*
	Gerridae	*Limnogonus fossarum*
Lepidoptera	Pyralidae	*Cnaphalocrosis medinalis*
	Crambidae	*Scirpophaga incertulas*
	Crambidae	*Chilo supressalis*
	Crambidae	*Cnaphalocrocis medinalis*
	Noctuidae	*Naranga aenescens*
	Crambidae	*Nymphula depunctalis*
	Noctuidae	*Spodoptera litura*
Orthoptera	Pyrgomorphidae	*Atractomorpha crenulata*
	Trigonidiidae	*Anaxipha longipenis*
	Tettigoniidae	*Tettigoniidae SP*
Hymenoptera	Braconidae	*Macrocentrus philippinensis*
	Encyrtidae	*Copidomosomopsis nacoleiae*
	Braconidae	*Macrocentrus philippinensis*
	Ichneumonidae	*Xanthopimpla flavolineata*
Dermaptera	Anisolabididae	*Euborellia stali*
	Forficulidae	*Forficula auricularia*

The existence of dragonflies significantly affects the ecosystem because these organisms are predators. In addition, dragonflies in feeding webs also act as prey for predators, namely spiders, lizards and birds that prey on insects and frogs (Sigit, 2013). Presences of butterflies act as bio indicators for presence of particular plant species. Immense role of butterfly in pollination, also contribute to biodiversity maintenance (Simhachalam *et al.*, 2017). The ability of organisms to adapt primarily arises from genotypic variations (Limpens *et al.*, 2008). Consequently, the plants that inhabit peatlands are limited to highly specialized species and have tight adaptive capacities (Minayefa, 2017). Revealed the abundance of individuals and species due to several factors, including the type of plants cultivated around peat and plants on peatlands. Monoculture and polyculture influence terrestrial arthropod diversity. Polycultural stands to have the potential to support an enormous species array either through species-specific associations, which are controlled directly by additional tree species (Utami *et al*., 2019).

The diversity of fish in peatland swamps and rivers is quite diverse. Fish are considered an important nutritional source among many cultures especially in coastal areas and fish are signified from other meats due to their cheap economical cost and digestibility (Alotaibi *et al.*, 2023) and the fact that it contains many essential elements like proteins, phosphorus and potassium (Sit, 2021). This Swamp holds a relatively abundant diversity of fish and aquatic biota. This area is utilized by the local community or people from other regions to carry out fishing activities and it is a favorite place to catch fish, especially Tilapia (*Oreochromis niloticus*) and Snapper (*Lates calcalifer*). Various types of fish tend to scattered in freshwater waters, whether in swamp areas and river streams (Table 2).

Data in Table 2 above shows that the species diversity in the Swamp ecosystem in Sukamaju Village is lower when compared to other Swamps in Merauke Regency, such as Dogamit Swamp, which managed to identify 15 fish species (Maloky *et al*., 2021) and Kaiza Swamp 12 species (Sentosa and Satria, 2015). Still, almost the same amounts of species were found, namely eleven species in the waters of the Blue Swamp of Wasur National Park (Harris, 2018). The highest total catch of fish was found at Station II, which was 63% and Station I was only 37%. The location of Station II is a supporting factor for the number of fish found more than other stations. Station II is an area in the form of a stretch of community land, a small portion of which is managed for local village farming. Moreover, various vacant lands have not been optimally utilized for agricultural activities, so swamps and drainage existences around this area have not been widely utilized. The community still carries out a few fishing activities. The abundance of fish at the two research stations in Kampung Sukamaju Swamp waters is presented in the Fig 1.

The percentage of occurrence also influences the distribution of the abundance of each fish species at the study site. Meanwhile, at Station I, 10 fish species were found, while at Station II, there were 11 species. *H. sagor* fish (thorn fish) were only found at Station II and were not found at all at Station I and there were 4 species whose numbers were known to be found in large numbers at both stations, namely *O. niloticus, C, striata, C. batrachus* and *P. papuensis*. The presence of *C. striata* is known by the local community under the local name “Gastor” (snakehead fish), be the species with the highest abundance at Station II found as many as 379 individuals and at Station I as many as 217 individuals. The second abundant species is *O. niloticus*, with 256 species at Station II and 115 individuals at Station I. The abundance of species and the number of individual fish in the waters of Kampung Sukamaju Swamp can be seen in Fig 1.

Some of the species found are known as introduced species, including tilapia (*O. niloticus*), Gastor fish (*C. striata*) and Betok fish (*A. testudineus*). The existence of this species in the research location needs to be watched out for because it is generally predatory, has omnivorous habits and even has a tendency to shift other communities in local waters. Furthermore, Sentosa and Satria (2015) added that Gastor fish tend to be found in waters where there are endemic fish such as the Papuan Arowana which is raising Arowana

Table 2: Classification of types in the swamp ecosystem of Sukamaju village in Merauke regency.

Class	Family	Genus	Species	Local name
Actinopterygii	Cichlidae	*Oreochromis*	*Oreochromis niloticus* (Linnaeus, 1758)	Nila
Actinopterygii	Cichlidae	*Oreochromis*	*Oreochromis mossambicus* (W.K.H. Peters, 1852)	Mujair
	Latidae	*Lates*	*Lates calcarifer* (Bloch, 1790)	Kakap Rawa
	Cyprinidae	*Cyprinus*	*Cyprinus carpio* (Linnaeus, 1758)	Mas
	Channidae	*Channa*	*Channa striata* (Bloch, 1793)	Gabus/Gastor
	Clariidae	*Clarias*	*Clarias batracus* (Linnaeus, 1758)	Lele
	Anabantidae	*Anabas*	*Anabas testudineus* (Bloch, 1792)	Betik
	Kurtidae	*Kurtus*	*Kurtus gulliveri* (Castelnau, 1878)	Kaca
	Toxotidae	*Toxotes*	*Toxotes chatareus* (Hamilton, 1822)	Sumpit
	Ariidae	*Hexanematichthys*	*Hexanematichthys sagor* (Hamilton, 1822)	Duri
	Megalopidae	*Megalops*	*Megalops cyprinoides* (Broussonet, 1782)	Bulan Bulan
	Plotosidae	*Plotosus*	*Plotosus papuensis* (Weber, 1910)	Sembilang

chicks. The two stations did not show a significant difference where at Station I and Station II the diversity index values ranged from 1.7951-1.9401 where this value entered the value 1.0<H'<3.5 and was categorized as having a moderate species diversity value (Maloky *et al*., 2021). There were more community activities at Station I than Station II which were considered to have a different effect on the diversity of fish species at this second station.

Sriwidodo *et al*. (2013) added that the composition and abundance of fish can also be affected by seasonal changes. Seasonal changes will affect environmental parameters such as temperature, pH and brightness. Based on the measurement results, it was found that the pH range was between 5-7, for temperatures between 28-35°C and the brightness for sunlight penetration was between 65-160 cm. The uniformity index value (E) has a slight difference where the uniformity index at Station I is 0.8090. This value indicates that the E value at Station I is in a stable condition with a high uniformity value (0.6 < E ≤1.0), the same value is shown for the uniformity index (E) at Station II worth 0.7224 so it is included in the category community and the value of equity is high and is in a stable condition. On the other hand, the dominance index value (C) shows a different trend, where at station I the C value is 0.1922 and station II is 0.2234. Both dominance index values are in 1 value range, namely 0 < C≤0.5 and categorized as low dominance for each species. So, the relative diversity and uniformity values are classified as moderate, stable and inversely proportional to the dominance index, where no single species dominates at the two research stations. Other fishery potential besides fish found in the waters of Kampung Sukamaju, there are also various aquatic plants and macrobenthos.

Fauna found in this research site not just limited with fish species but also we had successfully identified the macrobenthos in Sukamaju Village Swamp. There are 2 classes consist of 6 family and 8 species (Table 3). Mostly of the family belongs to Class of Gastropods, meanwhile another 2 family belongs to Class of Bivalve.

At Station I the percentage of presence reached 43%, while for Station II it reached 57%. However, the number of species found at Station I was much less, namely as many as 5 species, compared to Station II which reached 7 species. The environment of aquatic plants in the same time supporting the existence of organism such as gastropooda and bivalve. The characteristic of Station II is the location less of human acitivity and found many tree and aquatic plants in the edge of the swamp. However, the tren had show the same pattern with the numbers of fish. The abundance of molluscs in Stations I and II came from 2 significant classes of the Mollusc phylum, namely the Gastropod Class and the Bivalve Class. The most common

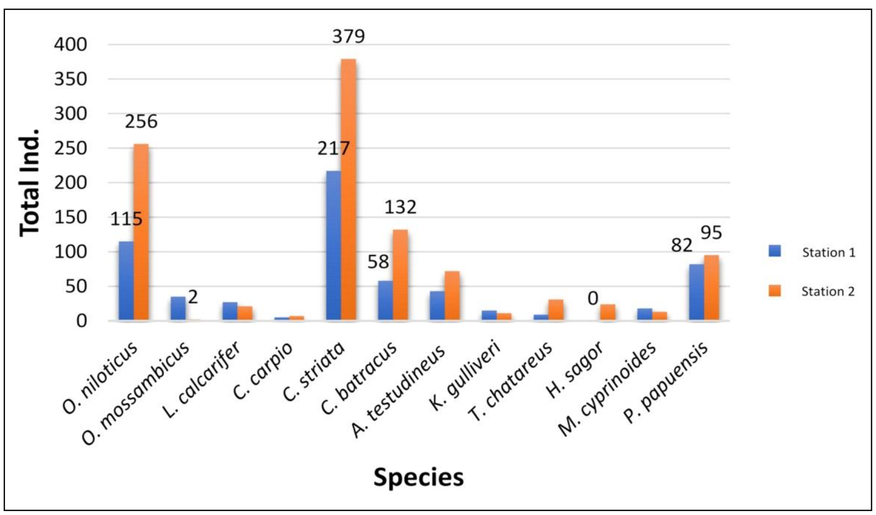

Fig 1: The abundance of fish Distribution in the Swamp of Sukamaju Village.

Table 3: Classification of macrozoobenthos in Sukamaju village swamp, Malind District.

No.	Class	Family	Genus	Species	STI	ST2
1	Gastropoda	Ampullariidae	*Pila*	*Pila ampullacea* (Linnaeus, 1758)	√	√
			Pomacea	*Pomacea canaliculata* (Lamarck, 1819)	√	√
		Achantinidae	*Lissachatina*	*Lissachatina fulica* (Férussac, 1821)	√	√
		Viviparidae	*Filopaludina*	*Filopaludina javanica* (von dem Busch, 1844)	-	√
		Nassariidae	*Anentome*	*Anentome helena* (von dem Busch, 1847)	-	√
2	Bivalvia	Unionidae	*Pyganodon*	*Pyganodon grandis* (Say, 1829)	-	√
			Pilsbryoconcha	*Pilsbryoconcha exilis* (I Lea, 1838)	√	√
		Cyrenidae	*Polymesoda*	*Polymesoda erosa* (Rafiinesque, 1820)	√	-

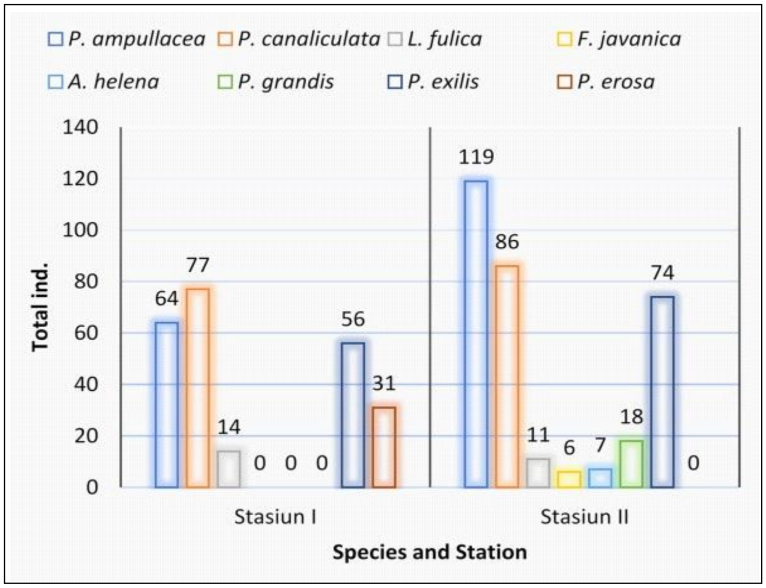

Fig 2: Distribution of the abundance of species and a number of molluscs.

species of *P. ampullacea* were found both at Station I and Station II, namely 64 individuals at Station I and 119 individuals at Station II, followed by *P. canaliculata* species with 77 individuals at Station I and 86 individuals at Station II, while the species *Pilsbryoconcha exilis* (initially looks like *Sinanodonta woodiana*) at Station I as many as 56 individuals and Station II as many as 74 individuals. Based on the presence of species, it can be seen that there were 3 species not found at Station I, namely *F. javanica, A. helena* and *P. grandis*, while at Station II, the species *P. erosa* was the only species not found (Fig 2).

The existence of these clams or bivalves which are generally known as mussels from the Unionidae family are known as clams that have relatively large valves. It also spread from the islands of Sumatra, Java, Kalimantan, Bali, Madura and Papua (Marwoto and Isnaningsih, 2014; Astari *et al*., 2018). According to Louloulia *et al*. (2018) the presence of bivalves in nature is closely related to environmental parameters, where it is known that the total organic matter content influences their presence in sediments which ranges from 80-94% when compared to the total organic matter content in water. This means that the presence of sediment has a stronger influence on the abundance of mussels in their habitat. The same pattern molluscs show is similar to the community structure found in other organisms such as fish. The existence of bivalves, especially the species *P. exilis* and *P. erosa*, is also influenced by the presence of fish as a medium for growth in one of their breeding stages. Before settling in the substrate habitat, bivalves during the glochidia stage will make fish as hosts, which generally attach to the gills of fish in these waters (Louloulia *et al*., 2018; Thorn, 2023).

CONCLUSION

In the peatland rice ecosystem, 7 orders and 30 families were found, with a total population of 1,231 individuals. The most dominant types of insects are the orders Coleoptera and Hemiptera and Lepidoptera. High diversity index (H′=3.021), high evenness index (E=0.86243) and low dominance index (D=0.3101). The types of Lepidoptera, Diptera and Hemiptera are often found around rice fields. Fish community structure obtained diversity index (H′) included in the medium category, for uniformity values in the high category and dominance index values in the low category. The dominant fish species found were *Channa striata, Anabas testudineus, Lates calcalifer, Mugil cephalus, Plotosus papuensis* and *Toxotes chataerus*, while *Oreochromis niloticus, Oreochromis mossambicus, Hexanematichthys sagor* and *Megalops cyprinoides*. While the types of molluscs found to have the highest abundance were *Pila ampullacea, Pomacea canaliculata* and *Pilsbryoconcha exilis.*

Conflict of interest

All authors declared that they have no conflict of interest.

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