

Species Diversity, Abundance and Distribution of Benthic Macroinvertebrates in Phung River, Sakon Nakhon Province

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Abstract

This study aims to survey a species diversity, abundance and distribution of benthic macroinvertebrates in Phung River, Sakon Nakhon Province. Benthic macroinvertebrates were sampled by using D-frame dip net in wadeable stream and using Ekman Grab in deeper zone in reservoir between December 2017 and September 2018. Eighteen stations were design for 4 occasional sampling in 3 seasons. Results, benthic macroinvertebrates were totally found 3,331 individuals in 24 family and 34 species. Mollusca were a most abundance of total animal found of 56%, follow by Arthropods 42%, and Annelida 1%. Benthic macroinvertebrates were mostly found on cool season (December 2017) follow by early cool (September 2018) and rain season (June 2018), 35%, 33%, and 32% respectively. Benthic Macroinvertebrates were mostly distributed on lower zone (sites 13-18) 44%, followed by upper zone (sites 1-5) and middle (sites 6-12) of 28% as the same. The mean of physic-chemical parameters of water were Dissolved Oxygen 7.86 mg/L, Hardness 45.04 mg/L, Alkalinity 31.93 mg/L, pH 6.96, Nitrite 0.18 mg/L, Ortho-Phosphate 0.13 mg/L, water temperature 28.03, water deep 1.53 m, water transparency 0.47 m, and electricity conductivity 94.12 μ S/cm.

Keywords: *Species diversity, distribution, Nam Phung Dam and River, Benthic Macroinvertebrates*

1. Introduction

Benthic macroinvertebrates are animal lives at the bottom substrates such as sediment, debris, logs, macrophytes, filamentous algae, etc. of freshwater habitat for at least of their life cycle [1]. They are composed primary of aquatic insects, crustaceans, mollusks, and various other invertebrate taxa [2]. They are functionally importance in many terrestrial and aquatic ecosystems [3]. They are importance on nutrients and energy transformation on ecosystem. Their roles were multilevel niche on food chain and webs. They serve as an intermediate role in the trophic level between primary procedure and

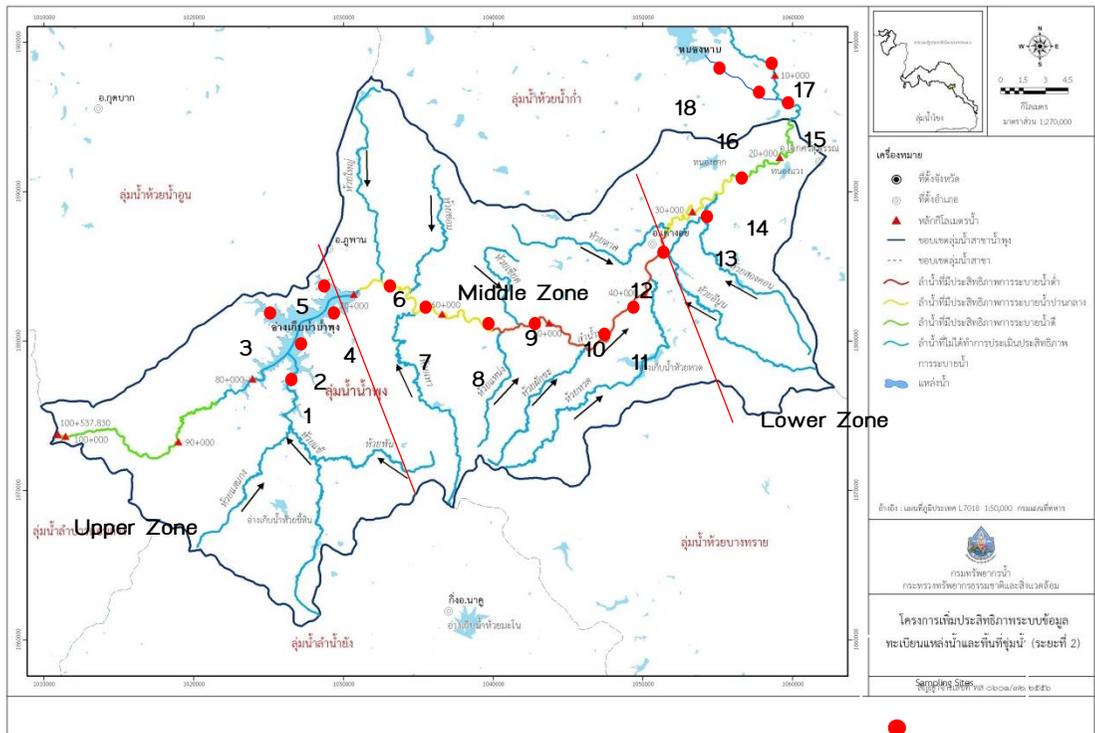
higher consumer which directly provide food for fish and some aquatic invertebrates [4, 5]. They are also, human foods [6, 7, 8]. Biomass was passing to higher level of consumers, e.g. fish, land animal, man etc. They live in local aquatic habitats which in the same area of human lives, whereas the water channel received a several kinds of discharge regimes through lower downstream. The intolerance and duration to some of stressors was the importance aspects for using ecological monitoring. Then they were mostly uses as bio indicator for ecological assessment [9, 10]. Also they caused of several human disease [6, 7]. The Phung Basin was a small catchment of Mekong Basin. It was **881** Km² located at upper portion of northeastern of Thailand. The study on benthic Macroinvertebrates in these areas was scarcely. Some previous study in this area was taken on diversity of water bugs (Hemiptera) were found 11 family, 32 genera, and 41 species [11]. There are study of Mayflies (Ephemeroptera) were found 8 family, 18 genera, and 30 species [12]. The applying study on benthic macroinvertebrates in this area was bio assessment by using its community [13]. In this work, we need survey the diversity (number of taxa, and abundance) and distribution of benthic macroinvertebrates along the length of Phung River, Sakon Nakhon Province.

2. Material and Methods

2.1 Study area and Sampling sites

Study area was Phung Basin which located in Mekong II Basin, Thailand. Phung Basin was situated between latitude 16°54'51.1"N 103°54'17.1"E and longitude 17°09'12.2"N 104°16'52.9"E. The main stream of this basin was Phung River, 80 Km long. Upper zone of water basin was constructed as Nam Phung Dam. The main objectives of the Nam Phung Dam were electrical power, agriculture; scenario and protected flood were by products. The Nam Phung dam was rock fill dam with core zone of clay. The dam built up on November 14, 1965 with 21 Km² of flooding areas. The stored capacities were 165 Million Cubic Meter. The maximum electricity power was 6,000 KW with 2 generators [14]. Middle zone were pass through the agricultural areas. Lower zone was still agricultural areas and drain to Nong Han Lake, then drain through the Mekong River.

The eighteen sampling sites were located along water course, Phung River. We design three groups of sampling sites, as upper, middle and lower zone. The sites numbers 1-5 were located at Dam, numbers 6-12 on middle and numbers 13-18 on lower of water course (Fig 1).



Picture 1 Study area and Sampling sites in Phung River [15].

2.2 Sampling of Benthic Macroinvertebrates

The quantitative and semi-quality sampling was conducted. The quantitative sampling with Ekman grab was conducted on upper zone in Nam Phung Dam. The three replicated of sampling per site with Ekman grab were conducted at 5 sites of upper zone. The semi-quality sampling were using D-frame dip net with 500 um of mesh zise and three replicated of samples per sites were used at the 13 sites of middle and lower water course. We follow the sampling method with D-frame dip net of Getwongsa, et al. [12, 13] of multihabitat sampling methods.

After samples were collected each by Ekman grab or D-frame dip net, we clean samples with water and pace its in plastic bags and preserved in 95% ethyl alcohol. Then put it in plastic bag, packaged, label and stored in lower temperature wait for laboratories examines.

2.3 Measured of Physical-Chemical Parameters

The night physico-chemical parameters of water were measured at the same place of benthic macroinvertebrates samples. The dissolved oxygen of water (DO; milligram per liter) were measured at water surface with DO meter, YSI model 30. The hardness (milligram per liter) and alkalinity (milligram per liter) were measured with titrate method as follow with Swingle [16]. The acidity of water were measured with WTW Microprocessor pH meter 320. The Nitrite Nitrogen (milligram per liter) of stream were measured with titrate method follow with Swingle [16]. The ortho phosphate (milligram per liter) were measured with Hach DR/2000 meter. The water temperature (degree celcius) were measured on surface water with DO meter YSI model 30. The depth of water (meters) were measured with gravitation meter tape. The transparency (meters) of water were measured by using 20 cm diameter of Secchi Disk. The electricity conductivity (micro-Semen per centimetres) was measured with WTW Microprocessor pH meter 320.

2.4 Laboratory Study

Benthic macroinvertebrates were carried to Fishery Department Laboratory of Rajamangala University of Technology Isan Sakon Nakhon Campus, Thailand. The samples were cleaned with clean water, then transfer to white plastic plate. The sorting stage was separated any animals excluded out from non-living substances or debris. Vouchers of animal were preserved in 70% ethyl alcohol in vials. Benthic macroinvertebrates specimens were identifying to lower possible level, usually in family, genus or species by using stereo microscope. The Oligochaeta animals were classified as class level because of key lacked. The benthic macroinvertebrates were counted on each taxon groups and recorded data in spreadsheet of Excel Version 10. Benthic macroinvertebrates data were prepared in spreadsheet of Excel with rows of study sites by column of taxon.

The physico-chemical parameters of water were recorded in spreadsheet as the same way of benthic data.

Abundance of benthic macroinvertebrates was shown as density of animal by area. The area of sampling per site by d-frame dip net was 0.9m² (0.3m x 1m x 3 replicates). The area of sampling per site by Ekman grab was 0.18m² (0.3m x 0.3m x 3 replicates).

2.5 Data Analysis

All of biological and physico-chemical data were analyses by using mean, standard deviation and percentages.

3. Results

3.1 Diversity

Of 3,331 individuals of benthic macroinvertebrate were found. They were belonged in 34 taxa, 29 families, 14 orders and 3 phyla. The phylum Arthropoda was the most diversity, were found 20 taxa. The phylum Mollusca were found 13 taxa and phylum Annelida were found 1 taxa, as showed in table 1. Order Ephemeroptera was the most diverse of taxa in phylum Arthropoda, were found 5 species in 4 families, follow by Order Odonata, 4 species in 4 families. Three Order including, Diptera, Coleoptera and Trichoptera were found 3 species and 3 families as same. The phylum Mollusca was found 13 taxa, the snail was found 8 species in 3 orders, 7 families, and bivalves was found 4 species in 2 orders 3 families. Only one species of phylum Annelida, *Tubifex* sp. were found.

3.2 Abundance and density of Benthic macroinvertebrates

Phylum Mollusca was the most abundance of benthic macroinvertebrates were found. It was found 57% of total animals founded and mean density in 1 square meter was 47.14 individuals. Phylum Arthropoda was 42% of total found animals and dense of 36.28 individuals per square meter. Phylum Annelida was found only 1% of total found animals and dense of 0.51 individuals per square meter.

The three of most density of phylum Mollusca were *Corbicula* sp. (Corbiculidae), 16.58 individuals/m² follow by *Ademietta* sp. (Thiaridae), 11.30 individuals/m² and *Indoplanorbis* sp.(Planorbidae), 4.26 individuals/m², respectively.

The three of most density of Phylum Arthropoda were *Macrobrachium* sp. (Palaemonidae) 13.93 individuals/m², follow by *Ablabesmyia* sp. (Chironimidae) 3.33 individuals/m² and *Choaborus* sp. (Choaboridae) 2.69 individuals/m², respectively.

**Table 1 Density of benthic macroinvertebrates from the Phung River
 between December 2017-September 2018**

Order	Family	Taxa	Cold	Rain	Hot	Mean±SD
Oligochaeta	Tubificidae	<i>Tubifex</i> sp.	0.49	0	1.05	0.51±0.53
Decapoda	Palaemonidae	<i>Macrobrachium</i> sp.	12.28	22.65	6.85	13.93±8.03

Order	Family	Taxa	Cold	Rain	Hot	Mean±SD
Diptera	Chaoboridae	<i>Chaoborus</i> sp.	2.13	1.13	4.82	2.69±1.91
	Chironomidae	<i>Chironomus</i> sp.	1.98	3.4	0.19	1.86±1.61
		<i>Ablabesmyia</i> sp.	3.7	2.9	3.4	3.33±0.40
Coleoptera	Hydrophilidae	<i>Hydrobius</i> sp.	0.12	0	0.06	0.06±0.06
	Noteridae	<i>Noterus</i> sp.	0.31	0	0.68	0.33±0.34
	Psephenidae	<i>Psephenidae</i> sp.	0.94	0.72	1.02	0.89±0.16
Ephemeroptera	Baetidae	<i>Cloeon</i> sp.	0.19	0	0	0.06±0.11
	Caenidae	<i>Caenoculis</i> sp.	1.91	0	0	0.64±1.10
	Ephemeridae	<i>Eatonigenia</i> sp.	0.37	0.12	0	0.16±0.19
		<i>Ephemera</i> sp.	2.21	1.73	1.93	1.96±0.24
	Polymitarcyidae	<i>Povilla</i> sp.	1.11	0.02	0.75	0.63±0.56
Hemiptera	Nepidae	<i>Ranatra</i> sp.	0.99	0.84	1.6	1.14±0.40
Odonata	Aeshnidae	<i>Tetracanthagyna</i> sp.	1.29	0.02	1.56	0.96±0.82
	Gomphidae	<i>Megalogomphus</i> sp.	2.16	0	0.06	0.74±1.23
	Lestidae	<i>Lestidea</i> sp.	0.06	1.85	3.89	1.93±1.92
	Libellulidae	<i>Macromia</i> sp.	0.06	0	0	0.02±0.03
Trichoptera	Dipseudopsidae	<i>Dipseudopsis</i> sp.	1.6	0.6	0.74	0.98±0.54
	Hydropsychidae	<i>Hydropsyche</i> sp.	0.74	0.34	0.62	0.57±0.21
	Polycentropodidae	<i>Polycentropus</i> sp.	0.62	1.71	2.16	1.50±0.79
Basematophora	Planorbidae	<i>Indoplanorbis</i> sp.	1.05	5.01	6.73	4.26±2.91
Mesogastropoda	Bithyniidae	<i>Bithynia</i> sp.	1.36	0.58	0.74	0.89±0.41

Order	Family	Taxa	Cold	Rain	Hot	Mean±SD
	Bithyniidae	<i>Wattebeledia</i> sp.	0.37	0.71	0.86	0.65±0.25
	Stenothyridae	<i>Stenothyra</i> sp.	2.72	0	0	0.91±1.57
	Thiaridae	<i>Ademietta</i> sp.	16.36	8.7	8.83	11.30±4.39
	Thiaridae	<i>Melanoides</i> sp.	0.99	0.18	0.56	0.58±0.41
	Viviparidae	<i>Filopaludina martensi</i>	3.4	2.28	6.17	3.95±2.00
Neogastropoda	Buccidae	<i>Clea</i> sp.	0.86	0.33	1.36	0.85±0.52
Acoida	Arcidae	<i>Scaphula</i> sp.	0.91	0.56	1.42	0.96±0.43
Unionoida	Amblemidae	<i>Ensidens</i> sp.	0.99	0.94	1.05	0.99±0.06
	Amblemidae	<i>scabies</i> sp.	6.73	0.41	0.99	2.71±3.49
	Unionidae	<i>Pilsbryochoncha</i> sp.	1.42	1.59	2.1	1.70±0.35
Veneroida	Corbiculidae	<i>Corbicula</i> sp.	11.48	19.2	19.07	16.58±4.42

3.3 Distribution on space and time

3.3.1 Space distribution

The animal does not have a large spine, scattered by the place, arranged into a river, the upper part of the dam. The Central Phung River and the river belly the end before flowing into the swamp. It is displayed in table 2 with 11 types distributed in all 3 parts: macrobrachium sp. chaoborus sp. noterus sp. megalogomphus sp. lestidea sp. hydropsycha sp. corbicula sp. -section 21 of the 2 section, which is only found at the end of the river Belly, the second table is a cloeon sp.

The dispersion of the animal does not have a large spine on the river, the upper part of the dam (station 1-5). It is the most dense type found that an average of 21.56 per square meter macrobrachium sp. is a secondary group that is found to be an average of 12.28 per square meter, and Ademietta sp. is a group that is found to be the third, with an average of 6.28 per square meter.

Distribution of large benthic invertebrates in the Central Belly River (Station 6–12). A total of 20 species of benthic invertebrates were found. The largest densely found benthic invertebrates were *Ademietta* sp. have an average of 19.53 individuals per square meter, followed by *Macrobrachium* sp. 15.93 individuals per square meter and *Corbicula* sp., an average of 13.70 individuals per square meter.

Distribution of large benthic invertebrates at the end of the Belly River before flowing into Nong Han (station 13-18). There were 34 species of benthic animals. The dorsal vertebrates were found to be very dense. The top 3 ranking numbers were *Macrobrachium* sp. With an average thickness of 21.59 individuals per square meter, followed by *Corbicula* sp., An average of 18.00 individuals per square meter and *Ademietta* sp. With an average value of 9.85 individuals per square meter. Sq m

3.3.2 Time distribution

The animal does not have a large spine on the ground, which is found 34 most species are distributed according to the season 3 seasons of the sample collection, except the *Stenothyra* sp. (*Stenothyridae*) and *caenoculis* sp. (*Caenidae*) and *cloeon* sp. (*Baetidae*), which is found only in winter. Not found in the collection of both summer and rainy season, the *eatonegenia* sp. (*Ephemeridae*) is found only in winter and rain. Not found in summer sample collection and *Hydrobius* sp. (*Hydrobius*) *Noterus* Sp. (*Noteridae*) *Megalogomphus* sp. (*Gomphidae*) found only in winter December and September was not found in the collection of rainy season.

In the winter (December 2015) found 34 species of boneless animals behind the top benthic soil. The most common is the top 3, *Ademietta* sp. (*Thaiaridae*), with an average of 16.36 individuals per square meter, followed by *Macrobrachium* sp. (*Palaemonidae*). 12.28 fishes per square meter and *Corbicula* (*Corbiculidae*), averaging 11.48 fishes per square meter.

During the rainy season (June 2016), 26 species were found. The top 3 most common benthic animals are *Macrobrachium* sp., An average of 22.65 individuals per square meter, *Corbicula* sp., An average of 19.20 individuals per square meter and *Ademietta* sp. Average of 8.70 birds per square meter.

During the summer season (September 2016), a total of 29 species were found. The top 3 benthic animals are *Corbicula* sp., With an average of 19.07 individuals per square meter, followed by *Ademietta* sp. With an average of 8.83 individuals per square meter. And *Macrobrachium* sp. Average of 6.85 individuals per square meter.

Table 2 Density of benthic macroinvertebrates were found in the Phung river between December 2017-September2018

Order	Family	Taxa	Upper	Middle	Lower
Oligochaeta	Tubificidae	<i>Tubifex</i> sp.	1.03	0.00	0.59
Decapoda	Palaemonidae	<i>Macrobrachium</i> sp.	12.28	15.93	21.03
Diptera	Chaoboridae	<i>Chaoborus</i> sp.	2.93	1.11	2.44
	Chironomidae	<i>Chironomus</i> sp.	4.22	3.78	0.74
		<i>Ablabesmyia</i> sp.	1.93	0.00	8.52
Coleoptera	Hydrophilidae	<i>Hydrobius</i> sp.	0.15	0.00	0.59
	Noteridae	<i>Noterus</i> sp.	0.22	0.59	0.37
	Psephenidae	<i>Psephenidae</i> sp.	0.15	0.00	0.74
Ephemeroptera	Baetidae	<i>Cloeon</i> sp.	0.00	0.00	0.22
	Caenidae	<i>Caenoculis</i> sp.	1.01	0.00	2.30
	Ephemeridae	<i>Eatonigenia</i> sp.	0.00	4.15	1.63
		<i>Ephemera</i> sp.	1.04	0.00	0.30
		Polymitarcyidae	<i>Povilla</i> sp.	0.00	0.15
Hemiptera	Nepidae	<i>Ranatra</i> sp.	0.59	0.96	0.74
Odonata	Aeshnidae	<i>Tetracanthagyna</i> sp.	1.43	0.11	1.19
	Gomphidae	<i>Megalogomphus</i> sp.	0.00	2.37	0.30
	Lestidae	<i>Lestidea</i> sp.	3.26	2.67	1.04
	Libellulidae	<i>Macromia</i> sp.	0.10	0.00	0.09
Trichoptera	Dipseudopsidae	<i>Dipseudopsis</i> sp.	0.81	0.00	2.89
	Hydropsychidae	<i>Hydropsyche</i> sp.	3.26	0.74	1.63
	Polycentropodidae	<i>Polycentropus</i> sp.	5.04	0.00	0.89
Basematophora	Planorbidae	<i>Indoplanorbis</i> sp.	5.63	3.63	4.96
Mesogastropoda	Bithyniidae	<i>Bithynia</i> sp.	1.93	0.00	8.52
	Bithyniidae	<i>Wattebeledia</i> sp.	1.11	0.00	1.41
	Stenothyridae	<i>Stenothyra</i> sp.	0.00	0.81	2.89
	Thiaridae	<i>Ademietta</i> sp.	6.28	19.53	9.85
	Thiaridae	<i>Melanoides</i> sp.	0.00	0.89	1.63
	Viviparidae	<i>Filopaludina martensi</i>	0.81	0.00	2.59
Neogastropoda	Buccidae	<i>Clea</i> sp.	0.00	0.89	3.41
Acoida	Arcidae	<i>Scaphula</i> sp.	1.04	0.00	3.04
Unionoida	Amblemidae	<i>Ensidens</i> sp.	0.00	2.07	15.33
	Amblemidae	<i>scabies</i> sp.	0.89	0.00	2.81
	Unionidae	<i>Pilsbryochoncha</i> sp.	0.00	4.15	2.59
Veneroida	Corbiculidae	<i>Corbicula</i> sp.	21.56	13.70	18.00

3.4 Physical-chemical parameters of water in the Phung River

Average physical water quality The chemistry measured in all 9 variables is shown in Table 3.

The average dissolved oxygen content is 7.86 milligrams per liter. In the winter (December 2015) 8.32 milligrams per liter Have an average higher than during the rainy season (June 2016) 7.19 milligrams per liter And late winter (September 2015) 7.62 milligrams per liter, respectively.

The average hardness is 45.05 milligrams per liter. The highest was found in the cold season of 50.84 milligrams per liter, followed by the hot season with an average of 40.74 milligrams per liter. And during the rainy season With an average value of 37.78 milligrams per liter respectively

The average nitrite value was 0.18 milligrams per liter. The highest value found in the winter equals 0.25 milligrams per liter. Followed by the rainy season was 0.15 milligrams per liter. And during the hot season the lowest was 0.08 milligrams per liter respectively.

The average orthophosphate was 0.13 milligrams per liter. The highest values are found during the rainy season. With an average of 0.36 milligrams per liter, followed by during the hot season.

The average value is 0.08 milligrams per liter. And during the cold season the lowest average was 0.04 milligrams per liter, respectively.

The average water temperature is 28.03 degrees Celsius, the highest measured during the rainy season. With an average of 28.67 degrees Celsius during the winter, an average of 27.83 degrees Celsius, and during the summer is 27.78 respectively.

The mean depth of water in the sampling area was 1.53 meters, the deepest measured during the cold season, 1.86 meters, followed by the rainy season. With an average of 1.39 meters in the summer is 1.04 meters respectively

The average transparency value is 0.47 meters during the cold and hot season, measured equal to 0.53 meters and during the rainy season. Can be measured equal to 0.28 meters respectively

The average electrical conductivity of water is 94.12 micro cementites per centimeter.

The highest values found during the hot season were measured at an average of 135.20 microcentimeters per centimeter. Followed by winter measurements, an average of 89.36 micro-centimeter per centimeter And during the rainy season With the lowest average of 62.57 microcentimeters per centimeter, respectively.

Table 3 Physical-chemical parameters of water in the Phung river between December 2017-September2018

Parameters	Cold	Hot	Rain	Mean±SD
Oxygen Dissolve (mg/L)	8.32	7.19	7.62	7.86±0.67
Hardness (mg/L)	50.84	40.74	37.78	45.05±6.8
Alkalinity (mg/L)	34.28	32.12	27.06	31.93±3.93
pH (SU)	7.29	7.09	6.19	6.96±0.53
Nitrite Nitrogen (mg/L)	0.25	0.08	0.15	0.18±0.2
Ortho Phosphate (mg/L)	0.03	0.08	0.36	0.13±0.16
Water Temperature (°C)	27.83	27.78	28.67	28.03±1.9
Depth of water (meters)	1.86	1.04	1.39	1.53±0.58
Transparency (m)	0.53	0.53	0.28	0.47±0.14
Electricity Conductivity (µS/cm ¹)	89.36	135.2	62.57	94.12±36.4

4. Conclusion and Discussion

4.1 Species diversity of benthic macroinvertebrates

The most common benthic invertebrates in this study were 20 species of Phylum Arthropoda. The order of 5 species of white-robed ascetic insects (Order Ephemeroptera). The number of white-robed ascetic insects found in this study was less than that of Phaiboon Ketsawasa (2001) in the watershed area of the Phong River. Which found as many as 30 white-robed ascetic larvae. In addition, Getwongsa, et al. (2010) found that in this area there were 24 species of white-robed ascetic insects.

Followed by the Order of Dragonfly (Order Odonata) of 4 types.

In this study found the only fresh water roll (Order Hemiptera) is Ranatra sp. , which is based on local education, Phu Phan National Park, as well as study in the River Phung. A large variety of fresh water is found up to 41 types (34 water Heng) and 28 types 2546 of stagnant water.

In this study, a group that finds a lot of secondary phylum Mollusca The oyster , both shells and a single clam. Found 13 types of proximity to meet by Getwongsa, et al., (2010) found 16 types

The phylum is phylum Annelida found only one number of types namely turbifex sp.

A study by Kasetsart University (2018) in Nong Han, at the back of the Pung River, found benthic animals consisting of 3 phylum 17 rank and 35 families.

4.2 Abundance and density of benthic macroinvertebrates

Large benthic invertebrates Phylum Mollusca is the most common group. Accounting for 56 percent of the total amount of animals found And the highest density is 47.14 birds per square meter. In which this group of animals is fed by a filterer and scraper (Sangpradub & Boonsoong, 2004) Somphong Sitthiprom (1999) found 29 freshwater mollusks in Phu Phan National Park. Many species of freshwater mollusks in this area were found because the streams were open streams with little shadow trees. With light reaching the water surface Makes the algae grow well (Getwongsa, et al 2010) May be the cause of the group of freshwater mollusks that are eaten by scraping, eat a lot of variety and are found to be very dense to 47 individuals per square meter.

The most common benthic invertebrates, followed by Phylum Arthropoda, account for 43 per cent of the total benthic population. With an average density of 36.28 birds per square meter. Phylum Annelida has 1% of total benthic quantity and has an average density of 0.51 fish per square meter.

4.3 Distribution of benthic macroinvertebrates

4.3.1 Space distribution

The spread of the animal is not a large spine, with a length of about 80 kilometers of the river Phung during December 2558 to September 2559.

Large benthic invertebrates are distributed throughout the river belly. The whole upper part of the dam area Mid Belly River And the belly river at the end before flowing into Nong Han The groups of 11 are generally distributed in all 3 areas, similar to the study. By Paiboon et. Al., (2010), which studied the distribution of benthic animals in conservation areas. And the area around the conservation area From this study, it was found that the 6 groups found were Corbicula sp., Macrobrachium sp., Ademieta sp., Ensidents sp., Indoplanorbis sp., Bithynia sp. And Ablabesmyia sp. The upper part of the river is blocked into a dam. Is a stagnant source of water This area is suitable for the habitat of animals that like to eat by filtering (scraper) and eat by scraper, such as the group Corbicula sp. In this

study, the largest number was found and shrimp were also found. *Macrobrachium* sp. The most common group was *Ademietta* sp. And *Indoplanorbis* sp.

The explosion of the animal does not have a large spine on the Central River (6–12 stations), found 20 species of soil. The animals do not have the bones behind the large soil. The first 3 most dense is *ademietta* sp. with an average of 19.53 per square meter, the second is *macrobrachium* sp. 15.93 per square meter and *corbicula* sp. average 13.70 per square meter

The dispersion of the animal does not have a large spine in the River, the rear part before the flow into the swamp. (The 13th – 18th station) See all 34 types of animals The animals do not have a bone after the large soil found. The top 3 most dense is *macrobrachium* sp. with an average thickness of 21.59 per square meter. The lower is *corbicula* sp. The average 18.00 per square meter and *ademietta* sp. with an average of 9.85 per square meter.

4.3.2 Time distribution

The dispersion of the animal does not have a large vertebral spine of the river Belly, followed during the winter months of December 2558, the rainy season of June 2559 and the summer of September 34 2559.

It was found that most of them are scattered according to the season except the genus *Stenothyra* sp. (*Stenothyridae*) and *caenoculis* sp. (*Caenidae*) and *cloeon* sp. (*Baetidae*), only found in winter. Not found in the collection of both summer and rainy season, the *eatonegenia* sp. (*Ephemeridae*) is found only in winter and rain. Not found in summer sample collection and *Hydrobius* sp. (*Hydrobius*) *Noterus* Sp. (*Noteridae*) *Megalogomphus* sp. (*Gomphidae*) found only in winter December and September was not found in the collection of rainy season.

During the winter (December 2558) found 34 species of animals with no bones behind the most common 3 large clay are *ademietta* sp. (*Thaiaridae*) with an average of 16.36 per square meter, the lower is *macrobrachium* sp. (*Palaemonidae*) 12.28 per square meter and *corbicula* (*Corbiculidae*) averages 11.48 per square meter .

During the rainy season (June 2559) found 26 types. The top 3 most common soil animals are *macrobrachium* sp. The average 22.65 per square meter *corbicula* sp. average 19.20 per square meter and *ademietta* sp. with an average of 8.70 per square meter .

During the summer months (September 2559) found 29 types. The top 3 most common soil animals are *corbicula* sp. The average 19.07 per square meter down is *ademietta* sp. with an average of 8.83 per square meter and *macrobrachium* sp. average 6.85 per square meter .

4.4 The water quality in the River Phung Sakon Nakhon

Water quality variables in the Belly River were found in the criteria of surface water source quality. (Department of Water Resources, 2019) Siraporn Photiwichayanon and others (2012) reported that the Nam Phong Dam dam is classified as a Category 2 surface water source.

Suitable for consumption and consumption, which must be disinfected normally and undergo general water quality improvement processes. Also included can be useful for the conservation of aquatic animals. Livelihoods of fishery, fishery and swimming and water sports

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