

## **FRESHWATER FISH DIVERSITY IN PULOKERTO MUSI RIVER, PALEMBANG-SOUTH SUMATRA: A PRELIMINARY RESULTS**

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### **ABSTRACT**

Pulokerto Area is a buffer zone area at the upstream region of Palembang city and serves as a water catchment area, as well as the support of green open spaces of the city. Palembang City government plans to change the use of area as an eco-tourism. This study aims to inventory the biodiversity of fish in the waters around the Pulokerto area as environmental indicators for policy making in the area due to land use change. Data were collected from three stations (using a 100 m mounted gillnets by fisherman in the water's edge at about 2 m depth). The gill nets were installed a night before, lasting for about 9 hours. Fish were collected in the range of 2-4 hours depending on the fishermen habits. The fish abundance was calculated by the method of catch per unit of effort and diversity index was calculated using Shannon diversity index. The results showed that of the three stations, 33 species of fish within 18 families and a total abundance 763 were recorded, dominated by Cyprinidae (10 species). Species diversity values ranged from 1.66 to 2.98, indicate a relatively good conditions. The quality of water is also relative good based on the state laws. The number of catch per unit effort in station I (3 times repeated): 39 individu (weight 1.33 kg); 63 individu (weight 0.56 kg) and 165 individu (weight 1.56 kg). Station II with only one time effort, recorded 64 individuals (0.06 kg weight). While on station III with three times efforts recorded respectively 53 (weight 0.79 kg); 219 (weight 3.03 kg) and 160 individu (weight 4.97 kg). The total of fish over 9 hours of installation gillnet found at station III (432 individuals weighing 8.79 kg) followed by station I (267 individuals weighing 3.45 kg) and station II (64 individuals weighing 0.06 kg). The study concluded that the fish diversity in the waters of the study area is still relatively well supported by water quality. Facilitation by the governments is needed to foster the fishermen to increase their income.

**Key words** : *fish biodiversity, catch per unit of effort, Pulokerto Musi River.*

### **INTRODUCTION**

Pulokerto region is an island located in the Musi River, at the upstream of Palembang City. This region is an area with a freshwater swamp forest typology follows the Musi River tidal pattern. The topography of the island is relatively flat, between 2-4 m above sea level, the highest rainfall was in October (469 mm) and lowest in July 77 mm (Bappeda, 2009). Based on the Palembang City Regulation No. 23 of 2000, Pulokerto Island with an area of 112 ha has been determined to be potentially agropolitan region as urban green open space (CBS, 2008). The main livelihood of community at the island is as fishermen and some as the tidal rice farmers. Government attentions for the development of the area was indicated by changes the land use plans as a tourist area based on agropolitan ecosystem which retains the function of the area as urban green space. The waters

around the area is a source of water for households, fishermen and sources of clean water to PDAM Tirta Musi and ecologically as a habitat, feeding ground, nursery grounds of various aquatic biota. Changes of land use plans to be expected to affect local fish populations. The research objective is to inventory the composition, number and diversity of fish species in waters around the Pulokerto.

## MATERIAL AND METHODS

The research was conducted in June to September 2011. Fish sampling was conducted at three stations / gillnets (local name "waring") owned by local communities who are routinely placed in local waters (Figure 1). Gillnets length of around 100 m with a depth of about 2 m and meshes average of 2.5 inches. The geographical positions of each station were as follows: S 03002'10.6", E 104040'31.7"; S 03002'18.2 " E 104039'34.0" and S 03002'24.3 "E 104039'53.0". Nets installed starting at 21.00 till 06.00 AM (approximately 9 hours). Fish was collected every 3-5 hour intervals based on the habits of fishermen. Maximum 3 times of repeated collection was conducted by following the fishermen. Fish abundance was calculated with the approach of catch per unit of efforts (Noerdjito and Maryanto, 2002) and fish species diversity calculated by following Shannon formula (Krebs, 1989).



Figure 1. Study area and location of gill nets in the waters of the Musi River Pulokerto  
(Source: Google Earth (2010) Skala 1 : 30.000)

## RESULTS AND DISCUSSION

### 1. Fish Species Composition

There were at least 33 fish species from 18 families found in three stations / gillnet fishermen's installed in the waters. The composition of fish communities consist of Familia Cyprinidae (10 species); Eleotridae and Siluridae (each family has 3 species), Bagridae and Serranidae (each has 2 species), while Pangasidae; Belontiidae, Engraulidae, Tetraodontidae, Cichlidae, Soleidae, Notopteridae, Loricariidae, Channidae, Toxotidae, Mastacembelidae, Hemirhamphidae, Pristolepididae each has one species. The complete data of fish community composition is presented in Table 1.

Table 1. Fish species composition found in the study area.

No.	Family	Local Name	Scientific Name
1.	Cyprinidae	Aronasi	<i>Lobocheilos</i> sp.
2.		Aropalau	<i>Labiobarbus festivus</i>
3.		Seluang	<i>Rasbora argyrotaenia</i>
4.		Sihitam	<i>Labeo chrysophekadion</i>
5.		Tembarau	<i>Osteochilus hasselti</i>
6.		Lambak I	<i>Dangila</i> sp.
7.		Lambak II	<i>Dangila ocelata</i>
8.		Puntung kanyut	<i>Balantiochelus malanopterus</i>
9.		Umbut-umbut	<i>Cyclohelictys repasson</i>
10.		Lampam	<i>Barbodes schwanefeldii</i>
11.	Siluridae	Lais I	<i>Kryptopterus kryptopterus</i>
12.		Lais apogon	<i>Kryptopterus apogon</i>
13.		Lais II	<i>Kryptopterus schilbeides</i>
14.	Eleotridae	Selontok hitam	<i>Butis butis</i>
15.		Selontok putih	<i>Glossogobius circumspectus</i>
16.		Betutu	<i>Oxyeleotris marmorata</i>
17.	Serranidae	Kebangalan	<i>Puntioplites waandersi</i>
18.		Kepala patin	<i>Chonerhinus amabilis</i>
19.	Bagridae	Lundu I	<i>Mystus nigriceps</i>
20.		Lundu II	<i>Mystus wolffii</i>
21.	Engraulidae	Bulu ayam	<i>Coilia</i> sp.
22.	Tetraodontidae	Buntal	<i>Tetraodon Palembangensis</i>
23.	Pangasidae	Juaro	<i>Pangasius polyuronodon</i>
24.	Hemirhamphidae	Julung-julung	<i>Zenarchopterus rasori</i>
25.	Soleidae	Lidah	<i>Achirorides leucorhynchus</i>
26.	Cichlidae	Nila	<i>Oreochromis niloticus</i>
27.	Notopteridae	Putak	<i>Notopterus notopterus</i>
28.	Loricariidae	Sapu jagat	<i>Hyposarcus pardalis</i>
29.	Belontiidae	Sepat mata merah	<i>Trichogaster trichopterus</i>
30.	Pristolepididae	Sepatung	<i>Parambassis wolffii</i>
31.	Channidae	Sepengkah	<i>Pristolepis grooti</i>
32.	Toxotidae	Sumpit	<i>Toxotes microlepis</i>
33.	Mastacembelidae	Tilan	<i>Mastacembelus erythrotaenia</i>

## 2. Population of Abundance

Musi River is widely known for the high potential of fisheries. Most of the residents who live on the waterfront have a livelihood as a fisherman. The population of fish in the Musi River was recorded more than 210 species scattered in various aquatic habitats (Husnah 2008). The result of recording on-site research shows that the total abundance of fish from all three stations/gillnets reached 763 individuals. Station III has a 432 catches, the most abundance compare to other stations, because this station is the catchment area which located in the very rich vegetated area, thus rich in organic matter of phytoplankton as a food source for fish.

The numbers of catch per unit of efforts in station I (3 times repeated) were 39 individu (weight 1.33 kg); 63 individu (weight 0.56 kg) and 165 individu (weight 1.56 kg). The numbers in Station II with only one time effort was 64 individuals (0.06 kg weight). While on station III with three times efforts recorded the numbers of fish respectively 53 (weight 0.79 kg); 219 (weight 3.03 kg) and 160 individuals (weight 4.97 kg). The total of fish over 9 hours of gillnets installment found at station III (432 individuals weighing 8.79 kg) followed by station I (267 individuals weighing 3.45 kg) and station II (64 individuals weighing 0.06 kg).

From all the inventoried fish (Table 2), some fish species dominate the waters (concerning their total abundance): lampam (*Barbodes schwanefeldii*) 17.7%; seluang (*Rasbora argyrotaenia*)

14.94%; kebangalan (*Puntiuoplites waandersi*) 10.74%; sepengkah (*Pristolepis grooti*) 11.93%; and other species with the proportion of less than 10%. Tilan (*Mastacembelus erythrotaenia*) was found with the abundance of > 10%, and it includes fish with categories has been significantly reduced in the waters of the river Musi (Utomo *et al.*, 2010). In contrast, lampam (*Barbodes schwanefeldii*) compared with other species, was found in high abundance 17.63%, although other studies classify it into the category of the species that has begun to decrease (Utomo *et al.*, 2010). This species is also found abundant in the waters of the Barito River (Haryono and Subagja, 2008). Seluang (*Rasbora argyrotaenia*) is found in all stations, showed that the species is still abundant in the Musi River around Pulokerto.

Table 2. Fish species and abundance in three stations of Pulokerto study area

No.	Local Name	Scientific Name	Stasiun	Stasiun	Stasiun
			I	II	III
1.	Aronasi	<i>Lobocheilos</i> sp.	12	2	10
2.	Aropalau	<i>Labiobarbus festivus</i>	5	-	-
3.	Seluang	<i>Rasbora argyrotaenia</i>	47	23	44
4.	Sihitam	<i>Labeo chrysophekadion</i>	3	-	5
5.	Tembarau	<i>Osteochilus hasselti</i>	3	-	-
6.	Lambak I	<i>Dangila</i> sp.	15	-	4
7.	Lambak II	<i>Dangila ocelata</i>	22	-	-
8.	Puntung kanyut	<i>Balantiochelus malanopterus</i>	1	-	-
9.	Umbut-umbut	<i>Cyclocheilichthys repasson</i>	-	-	40
10.	Lampam	<i>Barbodes schwanefeldii</i>	37	-	106
11.	Lais I	<i>Kryptopterus kryptopterus</i>	-	4	-
12.	Lais apogon	<i>Kryptopterus apogon</i>	-	-	1
13.	Lais II	<i>Kryptopterus schilbeides</i>	-	-	2
14.	Selontok hitam	<i>Butis butis</i>	3	15	10
15.	Selontok putih	<i>Glossogobius circumspectus</i>	10	3	16
16.	Betutu	<i>Oxyeleotris marmorata</i>	2	-	-
17.	Kebangalan	<i>Puntiuoplites waandersi</i>	33	1	52
18.	Kepala patin	<i>Chonerhinos amabilis</i>	-	-	-
19.	Lundu I	<i>Mystus nigriceps</i>	-	3	4
20.	Lundu II	<i>Mystus wolffii</i>	46	-	28
21.	Bulu ayam	<i>Coilia</i> sp.	-	-	-
22.	Buntal	<i>Tetraodon palembangensis</i>	1	-	-
23.	Juaro	<i>Pangasius polyuronodon</i>	1	10	-
24.	Julung-julung	<i>Zenarchopterus rasori</i>	-	-	1
25.	Lidah	<i>Achirorides leucorhynchus</i>	2	-	-
26.	Nila	<i>Oreochormis niloticus</i>	-	-	15
27.	Putak	<i>Notopterus notopterus</i>	1	-	-
28.	Sapu jagat	<i>Hyposarcus pardalis</i>	1	-	-
29.	Sepat mata merah	<i>Trichogaster trichopterus</i>	3	-	-
30.	Sepatung	<i>Parambassis wolffii</i>	6	1	-
31.	Sepengkah	<i>Pristolepis grooti</i>	5	-	86
32.	Sumpit	<i>Toxotes microlepis</i>	1	1	-
33.	Tilan	<i>Mastacembelus erythrotaenia</i>	9	1	10
	Abundance (individu)		267	64	432

Based on the size of the fish, seluang (*Rasbora argyrotaenia*) is indeed a species with a low weight (the largest weighing 10-30 g). As well as lundu (*Mystus wolffii*) with weight 30-40 g. This causes the total weight obtained from gillnet fishing (catch per unit effort) is low, as in station I (3.45 kg) and at station II (0.06 kg). In contrast to the third station the total weight of the fish reached 8.79 kg of fish communities due dominated by lampam (*Barbodes schwanefeldii*), sepengkah (*Pristolepis grooti*) and kebangalan (*Puntioplite swaandersi*) which weighted > 100 g.

### 3. Diversity Index

The Shannon diversity index of fish species at stations I and 3 respectively, 2.98 and 2.04, higher than at station II (1.66) as presented in Table 3. The low value in station II allegedly associated with the type of gillnet / conditions of the station which is dry at the time of the study, so removal of fish can only be done once a day, while the gillnet in the stations I and III is the type of gillnet fishing in a continuous states based on the Musi River tidal condition. The number of species of fish in Station I is 23 species, station III as many as 18 species, while station II only listed 11 species of fish.

Tabel 3. Shannon Diversity index of fish in the study area

Station	Number of species	Diversity index
1	23	2,98
2	11	1,66
3	18	2,04

Observations of water quality in the three stations of the study area, in general show that water quality is still able to support fish life. According to KPPL (1992 in Haryono and Subagja, 2008) and Pescod (1973), the water temperature is good for the life of fish <30<sup>0</sup> C, dissolved oxygen content > 5 ppm; turbidity <50 mg/l; hardness <60 mg/l; alkalinity 25-40 mg/l and nitrate <10 mg/l with pH value 6.5 - 8.5. Based on Governor of South Sumatra Regulation No.16 Year 2005, all parameters of surface water at the three stations in Pulokerto were still on the verge of predetermined quality standards. Water quality data at the study site are presented in Table 4.

Tabel 4. Data kualitas perairan di wilayah studi

Parameter	unit	Station			EQS*
		1	2	3	
pH		6	5,5	6	5-9
BOD	mg/l.	0,39	0,18	1,46	2
COD	mg/l.	6,21	7,08	7,8	10
TSS	mg/l.	6,5	9,8	11,5	50
TDS	mg/l.	1,8	2,7	1,9	1.000
Nitrit (NO <sub>2</sub> )	mg/l.	0,023	0,060	0,028	0,06
Nitrat (NO <sub>3</sub> )	mg/l.	2,53	3,25	2,38	10
Amoniak (NH <sub>3</sub> )	mg/l.	0,10	0,15	0,12	0,5
Fosfat (PO <sub>4</sub> )	mg/l.	0,1	0,07	0,08	0,2

\*Environmental Quality Standard: Governor of South Sumatra Regulation No.16 Year 2005

## CONCLUSION

1. Inventory of fish communities in the waters of the Musi River Pulokerto at three 3 stations recorded 18 families consisting of 33 species with total abundance of 763 individuals. The value of diversity in general is 1.66 to 2.98.

2. Lampam (*Barbodes schwanefeldii*), seluang (*Rasbora argyrotaenia*) and sepengkah (*Pristolepis grooti*) was found more abundant compare to other species.
3. The location of gillnets installment is one factor that determine the succesful of catching effort.
4. Guidance and informations are needed for the fishermen especially against the change of the land use plan of the area.

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