

Diversity of freshwater fish (Pisces) in Kumu River, Rokan Hulu District, Riau Province, Indonesia

Arief A. Purnama, Rofiza Yolanda

Biology Education Study Program, Faculty of Teacher Training and Education,
University of Pasir Pengaraian, Rokan Hulu District 28557, Riau Province, Indonesia.
Corresponding author: A. A. Purnama, ariefpurnama@upp.ac.id

Abstract. The objective of present study was to evaluate the diversity of freshwater fish at Kumu river, Rokan Hulu District, Riau Province, Indonesia. The sampling was done during March 2013 to June 2014 at three sampling locations by using fishnet with purposive sampling method around the Kumu river. We recorded 708 total individuals, 7 families and 35 species of fish in Kumu river. *Parachela oxygastroides* was the predominant species in this study. The diversity indices were in moderate category, dominance index was in low category and evenness index was in high category. In conclusion, the condition of this ecosystem was in stable condition.

Key Words: Cyprinidae, purposive sampling, diversity index, species, specimen.

Introduction. Fishes exhibit enormous diversity in their morphology, in the habitats they occupy and in their biology. They live in almost every conceivable type of aquatic habitat, e.g. marine, brackish and freshwater, in the world (Nelson 2006). About 40,000 species of fishes are known. Various workers have provided different schemes of their classification. However, no classification has been universally accepted because of the confusion due to staggering numbers of fishes and great diversity in their shape, size, habits and habitat (Kotpal 2009).

Fish are part of food chain dynamics, nutrient cycling and ecosystem resilience. Their mobility within the nested set of temporal and spatial cycles of ecological systems enhances the functional importance of fish as ecological memory in the form of energy, nutrients, genetic reserves and information. Fish also generate employment, function as a genetic library for possible future use in medicine and aquaculture, stimulate human interest in nature and provide aesthetic and recreational values. Certain ecosystem services generated by fish populations are also used as management tools, for example, in enhancing rice production, mitigating diseases in tropical zones, mitigating algal blooms, mitigating growth of lake vegetation and indicating ecosystem stress (Holmlund & Hammer 1999). Fishes currently represent about 16.6% of animal protein supply and 6.5% of all protein for human consumption. Fish is usually low in saturated fats, carbohydrates and cholesterol and provides not only high-value protein but also a wide range of essential micronutrients, including various vitamins, minerals and polyunsaturated omega-3 fatty acids. Thus, even in small quantities, provision of fish can be effective in addressing food and nutritional security among the poor and vulnerable populations around the globe (The World Bank 2013).

Due to their worldwide distribution and their importance role in ecosystems and human, many researchers have been studied about these organisms in the world, especially in Riau Province, Indonesia (Simanjuntak et al 2006; Pulungan 2009, 2011; Elvyra 2012; Fithra & Siregar 2010; Aryani 2015; Sutrisno & Wahyudi 2015). However, the data of fishes from Kumu river, Rokan Hulu District, Riau Province, Indonesia are still poorly known.

The condition of Kumu river has been polluted due to fishing, changing landscape into palm oil plantation and human settlements. Indirect effects of fishing can have more important impacts on aquatic ecosystem structure and function than the removal of the fish (Hammer et al 1993; Hughes 1994; Botsford et al 1997; Estes et al 1998). This study aims to determine the diversity of fishes from Kumu river, Rokan Hulu District, Riau Province, Indonesia.

Material and Method. This study was carried out from March 2013 to September 2014 by using fishnet with purposive sampling methods at three stations in Kumu river, Rokan Hulu District, Riau Province, Indonesia (Table 1). Fishes were collected from the river immediately and preserved in 70% alcohol. Collected fish samples were brought to the laboratory for their identification and preservation. The samples were identified by using relevant literatures (Nelson 2006; Kottelat et al 1993) than sorted, labeled and stored in bottle specimen. Data analyzing were the diversity index (Krebs 1999), the evenness index and dominance index (Magurran 1988).

Table 1
Sampling locations of the fishes in Kumu river, Rokan Hulu District, Riau Province

<i>Stations</i>	<i>Coordinates</i>	
Station 1	00°56'05,0" N	100°11'17,3" E
Station 2	00°55'01,2" N	100°13' 33,8" E
Station 3	00°55'56,9" N	100°20'14,4" E

Results and Discussion

Species composition. A total of 35 species belonging to 7 families (Cyprinidae - 23 species; Siluridae - 5 species; Bagridae - 2 species; Cobitidae - 2 species; Ambassidae - 1 species; Hemiramphidae - 1 species; Pristolepididae - 1 species) were collected in this study. The most common species in number of individual were *Parachela oxygastroides* (125 individuals), *Oxygaster anomalura* (113 individuals) and *Rasbora argyrotaenia* (108 individuals).

The family of Cyprinidae is the predominant in species number in this study, with 23 species. According to Nelson (2006), Cyprinidae is the main occupant of the greatest number of the population for several rivers in Sumatra in addition to the type of catfish (Bagridae, Clariidae, Pangasidae). Cyprinidae can be found in almost every place in the world except Australia, Madagascar, New Zealand and South America (although in some places it never made introductions). Cyprinidae have a rapid regeneration phase and a unique sensory organ such as sungut that can be used to detect source of food in the water. Its prey varied from small crustacean to larvae from other fish. Cyprinidae also play important role in the food web and has adaptation ability with environment (Kottelat et al 1993; Mohsin & Mohd 1991; Dina 2008).

Diversity, evenness and dominance index. The diversity index value (H') was ranged from 1.96 to 2.14, with an average 2.06 which indicate in moderate category. The evenness index ranged from 0.66 to 0.71 with an average of 0.69, which indicates a high category. In addition, the dominance index (C) ranged from 0.15 to 0.18 with an average 0.16 and indicates low dominance (Figure 1). According to Begon et al (2006), the existence of a species and the habitat sector in the total population is affected by lifestyle of such species. A species of fish that has a pattern of life able to adapt to various environmental conditions will have higher number of individuals in those waters and spread evenly.

Magurran (1988) explained that the species with the highest number of occurrences does not necessarily mean it is also the dominant species. The high dominance of one species probably indicates a stressful environment while a higher diversity indicates a stable condition of the ecosystem. High or low diversity index of a community affected by the richness of species and individual evenness constituent

communities. The higher the species richness and evenness, the higher the diversity index and so conversely the lower species richness and diversity index of the lower evenness in the community (Kendeigh 1980).

Table 2

Checklist of fish from sampling stations in Kumu river, Rokan Hulu District, Riau province, Indonesia

No	Family	Species	Vern name	Station			N
				I	II	III	
1	Ambasssidae	<i>Parambassis siamensis</i>	Siongkah	-	-	1	1
2	Bagridae	<i>Hemibagrus nemurus</i>	Baung	1	-	-	1
3		<i>Mystus nigriceps</i>	Tundik	1	1	1	3
4	Cobitidae	<i>Acantopsis dialuzona</i>	Sigirik Pasia	2	-	-	2
5		<i>Syncrossus hymenophysa</i>	Ciliang-ciliang	1	-	-	1
6	Cyprinidae	<i>Barbonymus schwanenfeldii</i>	KapieK	4	1	1	6
7		<i>Epalzeorhynchus kalopterus</i>	Silimang Kayu	2	-	-	2
8		<i>Cyclocheilichthys apogon</i>	Sibahan	4	3	22	29
9		<i>Hampala macrolepidota</i>	Sibarau	1	-	-	1
10		<i>Labiobarbus leptocheilus</i>	Sisik merah	-	-	7	7
11		<i>Labiobarbus lineatus</i>	-	4	-	-	4
12		<i>Labiobarbus fasciatus</i>	Siluang	-	-	2	2
13		<i>Luciosoma trinema</i>	Ikan Jua	4	-	-	4
14		<i>Osteochilus vittatus</i>	Paweh	2	2	1	5
15		<i>Osteochilus microcephalus</i>	Siburuak	1	2	7	10
16		<i>Osteochilus waandersii</i>	-	2	2	-	4
17		<i>Oxygaster anomalura</i>	Pimpiang	5	4	104	113
18		<i>Parachela hypophthalmus</i>	-	-	-	6	6
19		<i>Parachela oxygastroides</i>	Pimpiang	4	2	119	125
20		<i>Puntioplites bulu</i>	-	-	-	18	18
21		<i>Puntius lateristriga</i>	-	6	2	-	8
22		<i>Rasbora argyrotaenia</i>	Bada	66	26	16	108
23		<i>Rasbora caudimaculata</i>	Bada	25	14	41	80
24		<i>Rasbora dusonensis</i>	Bada	29	15	9	53
25		<i>Rasbora trilineata</i>	Bada	31	2	-	33
26		<i>Rasbora elegans</i>	Bada	-	9	-	9
27		<i>Rasbora rutteni</i>	Bada	4	-	-	4
28		<i>Thynnichthys thynnoides</i>	Motan	-	-	2	2
29	Hemiramphidae	<i>Hemirhamphodon phaiosoma</i>	Cuncuang	3	-	1	4
30	Pristolepididae	<i>Pristolepis grootii</i>	Katong	-	-	4	4
31	Siluridae	<i>Kryptopterus limpok</i>	Silais	-	-	4	4
32		<i>Kryptopterus mononema</i>	Silais	-	2	8	10
33		<i>Kryptopterus schilbeides</i>	Silais	11	4	-	15
34		<i>Ompok eugeneiatus</i>	Silais	-	-	29	29
35		<i>Ompok hypophthalmus</i>	Silais	1	-	-	1
Total				214	91	403	708

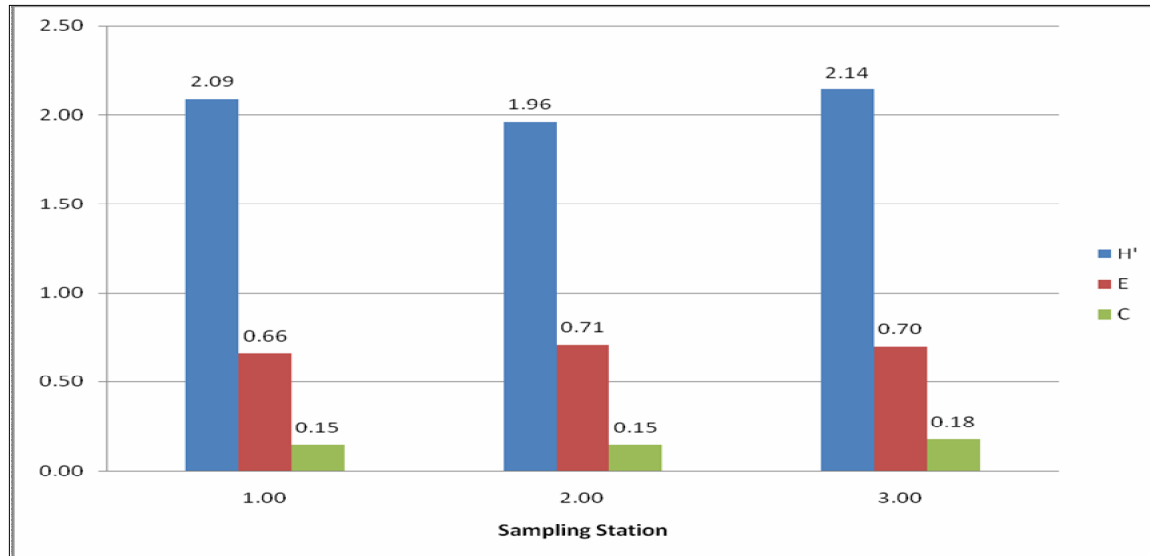


Figure 1. The value of diversity index (H'), evenness index (E), and dominance index (C) according to sampling sites.

Conclusions. The diversity index of fish in Kumu river was in moderate category, evenness index in high category and dominance indices in low category. *Parachela oxygastroides* was predominant in this area. In addition, the evenness index was at high level. Overall, this ecosystem was in a stable environment.

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Authors:

Arief Anthonius Purnama, Biology Education Study Program, Faculty of Teacher Training and Education, University of Pasir Pengaraian, Rokan Hulu District 28557, Riau Province, Indonesia, e-mail: ariefpurnama@upp.ac.id

Rofiza Yolanda, Biology Education Study Program, Faculty of Teacher Training and Education, University of Pasir Pengaraian, Rokan Hulu District 28557, Riau Province, Indonesia, e-mail: padangers@gmail.com

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