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FISH COMPOSITION OF LAYANG RIVER ESTUARY, KLABAT BAY, BANGKA ISLAND, INDONESIA

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ABSTRAK

Perairan dicirikan oleh adanya fluktuasi pasang surut dan variasi salinitas. Jenis-jenis ikannya memiliki tingkah laku adaptasi terhadap fluktuasi kondisi lingkungan perairan ini. Perairan muara merupakan ekosistem produktif dan memilik peran penting untuk kelangsungan hidup ikan laut. Penelitian ini ditujukan untuk mengetahui komposisi ikan dan kondisi lingkungan perairan Muara Layang sebagai masukan dalam mengembangkan konservasi sumberdaya ikan di wilayah ini. Penelitian ini dilakukan pada tahun 2004-2008. Sampel ikan diambil menggunakan jaring insang milik nelayan, Informasi jenis ikan juga diperoleh melalui diskusi kelompok. Informasi tentang siklus hidup distribusi, habitat dan kebiasaan makan diperoleh dari informasi sekunder. Terdapat 26 jenis ikan yang didominasi oleh ikan-ikan pendatang dari laut yang sebagian siklus hidupnya tergantung pada perairan muara. Ditinjau dari fungsi biodiversitasnya didominasi ikan bentopelagik dan tergolong ikan bentikvorus, menunjukkan pentingnya perairan Muara Layang untuk mendukung siklus hidup ikan dari laut. Terdapat perbedaan salinitas pada stasiun bagian hulu dan hilir muara sungai.Salinitas yang mewakili musim hujan juga berbeda dengan musim kemarau. Turbiditas meningkat pada musim hujan, sedangkan DO mengindikasikan terdegradasi.

Kata kunci : Muara, Layang, ikhtiofauna, teluk Klabat, pulau Bangka

ABSTRACT

Estuary is a mixing area of freshwater and salty water coming from the sea. Fluctuation of tide and the ebb of sea water create a unique characteristic of this water body ecosystem. The ichthyofauna also has a behavior adaptation to the fluctuation of environmental in this system. Estuary is productive ecosystem and plays important role for marine fish species. The study was aimed to elucidate the fish composition and environmental condition of Layang estuary as an input for developing conservation of fish resource in this area. Fish sample was collected using a monofilament gill net belong to fisherman. Fish species information was also obtained through focus group discussion. Information about life cycle category, distribution, habitat and trophic group were collected from secondary source. There are 26 fish species dominated by marine migrant that some have a part of their life cycle dependent on estuarine system. From the functional biodiversity point of view, the fishes are benthopelagic and benthic species belong to benthicvorous group indicates the importance of Layang river estuary to support life cycle of marine migrants species. Spatially, there was a different salinity between upstream and down stream monitoring sites. Temporally salinity of the month representing the rainy season are also different from the dry season. Turbidity increased during observation especially in the rainy season while DO showed under continues degradation.

Keywords : Estuary, Layang River, Ichthyofauna, Klabat Bay, Bangka Island.

INTRODUCTION

Estuary is a mixing area of freshwater and salty water coming from the sea. Fluctuation of tide and the ebb of sea water create a unique characteristic of this water body ecosystem. The ichthyofauna also has a behavior adaptation to the fluctuation of environmental condition in this system. According to Blaber (2000) most researcher of estuarine fishes fauna classified of fish base on various attribute, such as salinity tolerance, breeding, feeding and migratory habits. Day *et al*., (1981) *in* Blaber (2000) has modified the classification of estuarine fishes for temperate as well as tropical area estuarine fishes which includes five groups, of fish as follow: 1. Marine migrant species, that they may occur in estuaries both as adult and juvenile; 2. Anadromous species, that breed in freshwater and spend the time in estuaries on their way to and from their spawning ground; 3. Catadromous species, that ascend to freshwater as juvenile but return to the sea to breed; 4 Estuarine species, that complete their life-cycle in estuary; 5. Freshwater migrants that move varying distances down estuaries but usually return to fresh water to breed. Potter & Hyndes (1999) give diagrammatic representation of the various ways in which fish use estuaries and those belong to different lifecycle categories. For the example marine fish species which enter to the estuaries in large number are termed as marine estuarine - opportunities, while the marine fish species that occasionally enter to the estuaries irregularly and in small number are termed as marine stragglers or adventitious visitor. Furthermore, Whitefield (2005) *in* Vivier *et al*., (2010) classified marine fish species that breed in marine environment into marine immigrant, i.e. marine species of which the juvenile and or adults make extensive use of estuaries environment and show varying degrees of dependence on estuaries and marine stragglers, i.e. marine species that occasionally or with only small proportion of overall the population ever entering estuaries.

The various ways in which fish use estuary for supporting their life cycle indicate that estuary plays important role as a nursery, spawning ground and in facilitating the migratory of diadromous species to and from the sea (Vivier *at al*., 2010; Hajisamae *at al*., 2006; Ecoutin *et al*., 2005). In contrast with ecological importance, estuary is among the most modified and threatened aquatic environment. Because as productive ecosystems, estuarine have been among the most threatened by human activities which damage the ecological function, namely their nursery role for fish species (Goldman & Horne, 1983; Vasconcelos *et al*., 2007). Similar condition is found in most developing countries, that problem of estuary is conflicting in natural resources utilization.

Layang River is one of two major rivers drain to the Klabat Bay, located at The North part of Bangka Island. This island is an area of tin mining operated not only in the terrestrial area but also in the open water such as estuary. The growth of conventional tin mining practicing by local people has accelerated the environmental degradation of the estuary system around Klabat Bay. Geomorphological study showed that there was a change of mangrove area in Antan estuary and intensive sedimentation in lower part of Layang Estuary (Ridwansyah *et al*., 2004). This environmental degradation could threaten the fish habitat leads to fish diversity loss in estuary around Klabat Bay.

The study was aimed to elucidate the fish composition and environmental condition of Layang River estuary as an input for management and conservation of fish resources in this area. This study is a part of the research program of LIPI (Indonesian Institute of Sciences) on the development of conservation and management of biological diversity in River Layang Estuary, Klabat Bay, Bangka-Belitung Province in 2004 to 2008.

MATERIAL AND METHOD

The study location was Layang River estuary. Layang River is one of two major rivers drain to Klabat Bay, Bangka Island. Klabat Bay located on The North part of Bangka Island with the geographical position of 105° 40' – E 105° 50' and S 1° 30' – S 1° 45'. Two major river draining to this bay are River Antan in the West with catchment area of about 19,450 ha and River Layang in the Southwest with catchment area of about 35,569 ha (Figure 1). This region has a tropical climate which yearly rainfall average yearly 2717 mm, air temperature 25.9°C – 27.3°C, and humidity 77 – 89 %. The dry month takes place from July to September with lower rainfall 164.6 mm on August. The wet month takes place from December to April with highest rainfall 391.5 mm on December (Figure 2). River Layang estuary has average waters depth about 15 m with riparian vegetation of estuary was dominated by mangrove and forest on the upstream (Ridwansyah *et al.*, 2004).

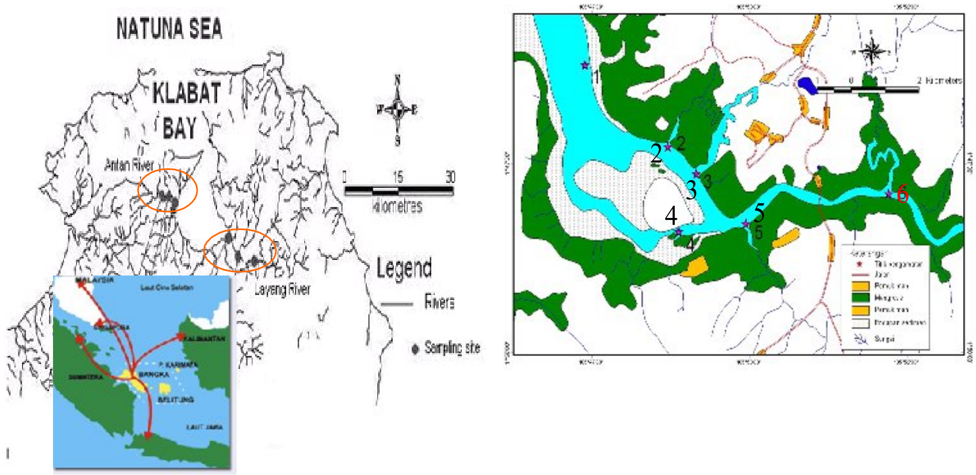

Figure 1. Location of Layang River Estuary and sampling site

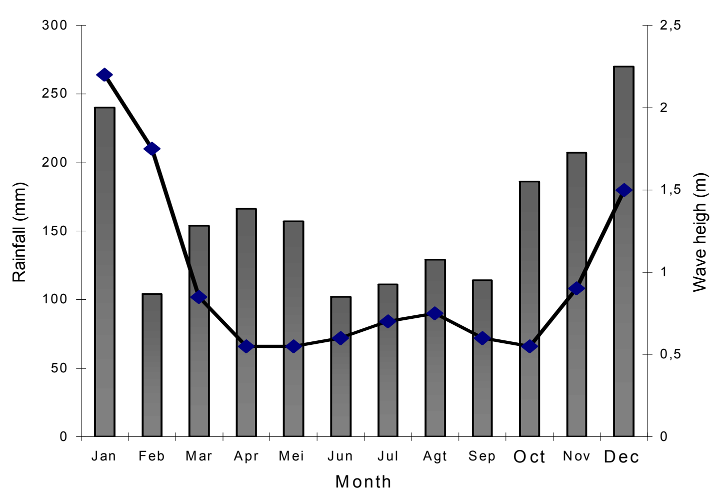

Figure 2. Average of rainfall and wave height in 1998 – 2002, at Cupat, Belinyu Bangka (Ridwansyah *et al.*, 2004).

Environmental data was collected at several sites in 2004 to 2008. The location and sites sampling are presented in Figure 1. Water quality parameters includes salinity, turbidity, temperature, pH and dissolved oxygen (DO) were measured *in situ* by using Horiba U-10 water checker and WQC 24 TOA-DKK. Water quality was measured at the surface, Secchi depth layers and bottom of waters.

Fish samples were collected in October 2004 by using monofilament gill net belong to fisher. Mesh size of gill net ranging from 50 to 150 mm (2″ to 6″). All fishes collected were preserved in formalin 10 % and identified according to Weber & Beaufort (1913, 1916). Fish species information was also obtained through focus group discussion. Information about life cycle category, distribution, habitat and trophic group were collected from secondary source (Vivier *et al.*, 2010; Potter & Hyndes, 1999; Kao & Shao; 1999; Blaber, 2000 and Sheave *et al*., 2007).

The fishes were classified according to their estuarine dependence life cycle following Day *et al*., (1981) *in* Blaber (2000). Those are Marine migrant species, that they may occur in estuaries both as adult and juvenile; Anadromous species, that breed in freshwater and spend the time in estuaries on their way to and from their spawning ground; Catadromous species, that ascend to freshwater as juvenile but return to the sea to breed; Estuarine species, that complete their life-cycle in estuary; Freshwater migrants that move varying distances down estuaries but usually return to fresh water to breed.

RESULT AND DISCUSSION

Environmental condition

Salinity showed a wide range value during observation (Table 1). According to Vaikangas *in* Nontji (1993), salinity of waters range from 0.5 to 17‰ is classified as brackish waters while more than 17 ‰ is sea waters. The variation of salinity in this estuary may relate to the ebb tide and rainfall. Sheaves *et al*., (2007) reported that the salinity profiles reflected the rainfall and stream flow. Almost all fishes living in subtropical and tropical estuaries are very euryhaline and routinely able to cope with salinities from almost freshwater (< 1‰) to at least (35 ‰). Among the most tolerant species are *Pomadasys commersonni* (0 – 90 ‰) and *Mugil cephalus* (0 – 90 ‰) (Blaber, 2000).

Spatially, there was a different salinity between upstream and down stream monitoring sites (Table 1). Average value of salinity show a tendency to increase to the down stream monitoring site and in contrast to the upper stream monitoring site, the salinity is more decrease. It is common phenomenon in estuary system that stream flow and rainfall influence the distribution of salinity concentration in the waters both horizontally and vertically. The average value of salinity tends to increase to bottom layer. It seems that salinity on the surface water is more influenced by river flow and in the bottom layer is more influenced by ebb tide.

Temporally salinity of the month representing the rainy season are also different from that of the dry season (Figure 3). The lower salinity concentration was recorded in November 2007, April 2008 and May 2008 while the higher salinity concentration was recorded in September 2004, October 2006 and August 2006. November is transition from dry to wet season and often have heavy rain. Similar condition, in May as a transition from wet to dry season was still influenced by rainy season (Ridwansyah *et al*., 2004).

Turbidity showed a wide range or range from clear to very turbid during observation (Table 1). Cyrus (1988) as cited by Blaber (2000) recorded a wide range of turbidities in 17 estuaries in Kwazulu-Natal, South Africa. Four of these were clear (<10 NTU), nine were semi-turbid (10-50 NTU), three were turbid (50 – 80 NTU) and one is very turbid (>80). In relation to turbidity, Cyrus and Blaber 1987 as cited by Blaber (2000) reported that the fishes could divide into tolerant or clear-water species (<10 NTU), partially tolerant (<50 NTU), widely tolerant (10 – 80 NTU) and indifferent turbidity (found at all turbidities). For example reported *Pomadasys commersonni* and *Terapon jarbua* were indifferent to turbidity.

Average value of turbidity declined to downstream site monitoring direction, especially in the surface and Sechhi depth layer (Table 1). This pattern may be related to the freshwater inflow. Generally freshwater inflow contains particles from terrestrial area that more suspend in the upper stream monitoring site. Temporally turbidity increased during observation especially in month representing of rainy season (November 2007, April 2008) (Figure 3). This is indicates that variability of turbidity was influenced by the freshwater run off. Kappenberg & Grabemann (2001) also reported that the long term variability of salinity and estuarine turbidity maxima in the Elbe and Weser Estuaries on the German coast was mainly influenced by freshwater run off. The higher rainfall in rainy season causes increasing the material load from terrestrial and suspension in the water. The high turbidity in November 2007 may be related with increasing mining activity in the watershed and causing particle of material load increase in freshwater run off.

Temperature ranged from 27.1 to 31.6 ^{o}C (Table 1). This is common condition for estuary in tropical area. Temperature of Mendahara river estuary and Lagan river estuary in Central Sumatra, Indonesia ranged from 28.0 to 32.2 ^{o}C and 27.0 to 30.7 ^{o}C respectively (Sanderson & Taylor, 2003). Spatially, temperature variations were relatively small. Variation of temperature

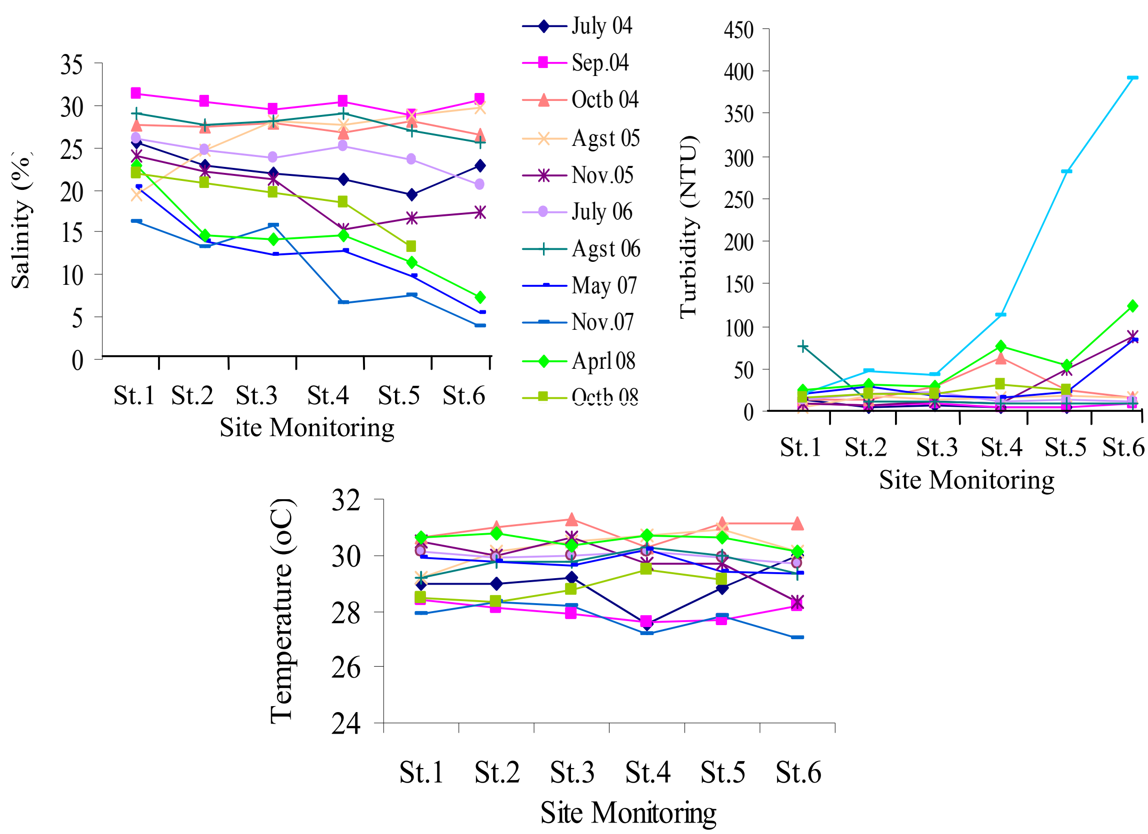

Figure 3. Mean salinity, turbidity and water temperature profile in month representing rainy and dry season for Layang River Estuary in 2004 to 2008.

was found in month representing rainy and dry season. The lower temperature was occurred in November 2007 and the higher was occurred in October 2004 (Figure 3). The temperature variation was presumably influenced by solar radiation.

Dissolved oxygen (DO) showed a wide range concentration during observation (Table 1). In the surface layer DO concentration ranged from 3.0 to 7.3 mg/L and in the bottom layer ranged from 2.1 to 7.0 mg/L. Spatially, low DO concentration was occurred in the Secchi depth layer and bottom of waters. Generally low DO concentration was occurred in month representative of dry season (October) (Figure 4). It may relate to the decomposition process of organic material.

Table 1. Range and average value of some environmental parameters at each site monitoring.

Parameters		Site monitoring					
		1	2	3	4	5	6
Surface	Range of salinity	14.3-31.4	6.4-31.5	6.9-29.4	5.4-30.3	2.0-29.9	1.5-30.6
	Average	23.9	21.2	21.2	20.2	19.1	17.9
Secchi	Range of salinity	2.9-31.4	9.0-30.5	12.5-29.5	5.6-30.4	2.0-28.9	1.4-30.7
	Average	22.1	21.7	22.8	20.8	19.445	18.3
Bottom	Range of salinity	19.9-30.5	14.0-30.4	12.6-29.7	8.7-30.4	11.1-29	8.9-30.9
	Average	24.8	23.7	22.9	21.6	21.8	20.8
Surface	Range of turbidity	5.3-26.0	3.0-53.3	6.0-81.6	4.0-132.9	5.0-404.5	6.0-535.2
	Average	13.7	19.5	21.1	25.1	63.3	107.1
Secchi	Range of turbidity	6.0-25.1	4.0-53.4	6.0-29.5	4.0-129.5	5.0-395-5	56.8
	Average	13.1	20.1	16.1	23.3	59.0	109.4
Bottom	Range of turbidity	6.0-215.7	7.0-38.1	5.0-44.0	5.0-188.6	5.0-58.2	85.8
	Average	34.7	18.5	20.0	48.0	23.6	25.9
Surface	Range of temperature	27.9-30.7	28.2-34.6	27.9-31.6	27.1-31.4	27.4-30.9	27.0-30.9
	Average	29.6	30.1	29.8	29.8	29.6	29.5
Secchi	Range of temperature	27.9-30.6	28.0-31.3	27.9-31.4	27.6-30.7	27.6-31.4	27.0-31.4
	Average	29.6	29.7	29.8	29.6	29.7	29.4
Bottom	Range of temperature	27.6-30.6	28.8-30.2	28-31	24.2-30.7	27.9-31.6	27.1-30.9
	Average	29.2	29.5	29.7	29.0	29.5	29.1
Surface	Range of DO	3.2-7.3	3.2-6.7	3.7-6.1	3.5-6.2	3.0-5.1	3.4-5.8
	Average	4.9	5.0	4.9	4.8	4.6	4.7
Secchi	Range of DO	2.8-6-9	2.9-6.5	2.6-5.3	2.6-6.1	2.4-5.6	2.5-5.8
	Average	4.7	4.6	4.5	4.6	4.4	4.1
Bottom	Range of DO	2.4-7.0	2.5-6.1	2.6-5.7	2.6-6.1	2.1-5.3	2.3-5.2
	Average	4.6	4.5	4.5	4.9	4.0	3.7
Surface	Range of pH	6.5-7.8	6.9-7.7	7.0-7.4	6.9-7.7	6.5-7.9	6.6-7.3
	Average	7.3	7.3	7.2	7.2	7.2	7.1
Secchi	Range of pH	6.5-7.9	6.7-7.5	6.9-7.4	6.9-7.4	6.5-7.4	6.4-7.4
	Average	7.3	7.2	7.1	7.2	7.1	7.0
Bottom	Range of pH	6.5-7.8	6.7-7.5	6.9-7.4	6.9-7.4	6.4-7.2	6.4-7.4
	Average	7.3	7.2	7.2	7.1	7.0	6.8

In Estuary system such as Layang River estuary is rich with of litters from riparian vegetation such as mangrove. The warm temperature in these months may also support the decomposition process of organic material. Concentration of DO tend to decline during observation (Figure 4). It may relate to the growth of conventional mining activity in river system which the method more emphasizes on the sediment mixing then low DO concentration move up to the upper column of waters.

Central Sumatra, Indonesia, have pH value ranged from 6.2 to 9.57 and 5.04 to 7.43 respectively (Sanderson & Taylor, 2003). There is a tendency of pH to decline in the upstream monitoring site direction. It is common phenomenon in estuary system that upper site is more influenced by freshwater inflow.

Fish composition

There were 26 fish species representing 17 families recorded in River Layang estuary. Base on the secondary data,

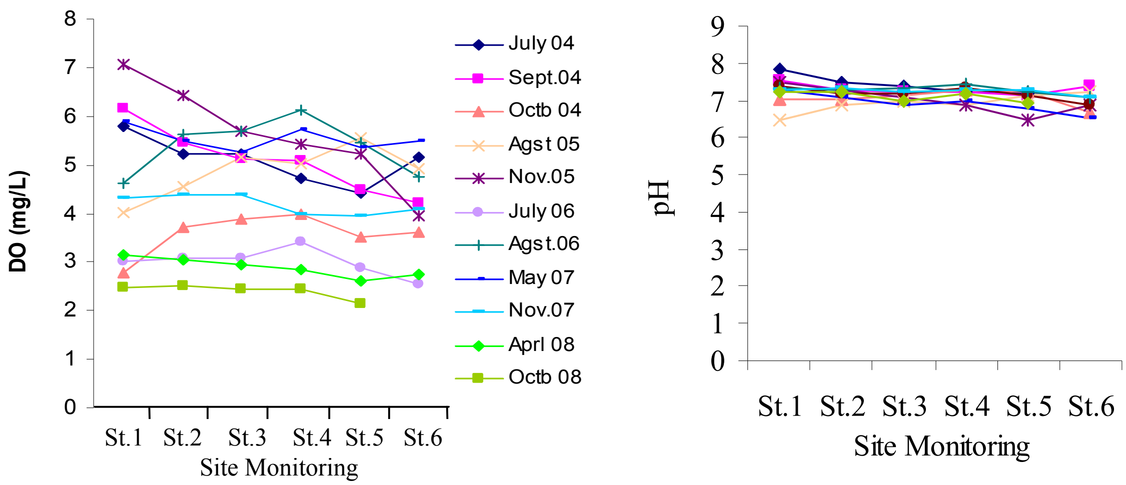

Figure 4. Mean Dissolved Oxygen (DO), and pH profile in month representing rainy and dry season for Layang River Estuary in 2004 to 2008.

In Indonesia, the standard concentration of DO for fisheries as regulated by The Government Republic of Indonesia (Peraturan Pemerintah No 20, 1990) is more than 3 mg/L. Furthermore Kirby-Smith *et al* (2003) reported that potential stress of DO to nekton < 2 mg/L, mainly in the upper and middle zone of estuary in a North Caroline branch estuary. Therefore base on the DO concentration water quality in this in Layang River estuary under continues degradation.

Range of pH was from 6.4 to 7.9 (Table 1). It is common condition for tropical estuary. pH value of Mendahara river estuary and Lagan river estuary in

the classification of the fishes life cycle category is presented in Table 2. From the total species, fish community was dominated by marine migrant which counted 22 species or 85 % (Table 2). There were three species classified as an estuarine species (*Ambasis* sp., *Gobius* sp. and *Scatophagus argus*) and one species frehwater fish species (*Toxotes jaculator*). The dominance of marine migrant fish species presumably related to the condition of Layang River Estuary. This estuary is open to the sea, so as there is a variation of salinity doe to influence of rainfall and ebb tide. Salinity ranged from 19.7 to 30.7 ‰ in month representing dry season and 3.9 to 22.67 ‰ in month representing rainy season (Figure 3). This type condition of estuary plays an essential role in facilitating the migration of marine fish from the sea to the estuary to complete their life cycle.

Table 2. Species composition and life cycle category of fishes in Layang River Estuary

No	Family	Species	Local name	Common name	Life cycle catagory	References
1	Ariidae	*Arius* sp.	Otik/Duri	Sea catfish	M	Blaber 2000
		Arius sagor	Manyong	Sagor catfish	M	
		Ketengeus sp.	Bedukang	Bigmouth catfish	M	
2	Ambasidae	*Ambasis* sp.	Beseng-beseng	Asiatic glassfish	E	Kuo & Shao. 1999 Vivier et al. 2010
3	Carangidae	*Chorinemus lysan*	Talang-talang	Jacks and Pompanos	M	Blaber. 2000
		Chorinemus sp.	Talang-talang	fish	MS	Kuo & Shao. 1999
			Bubara		M	Blaber. 2000
		Caranx sp.1	Bubara		MS	Kuo & Shao. 1999
		Caranx sp.2			M	Blaber. 2000
4	Clupeidae	*Clupea sp*	Tembang	Sardines	M	Blaber. 2000
		Anodontostoma sp.*	Selangit	Indonesian gizzard shad		
4	Cynoglossidae	*Cynoglossus* sp.	Ikan sebelah	Tonguesole fish	M MS	Blaber. 2000 Kuo & Shao. 1999
5	Dasyatidae	*Dasyatis* sp.*	Pari	Stingray	M MS	Blaber. 2000 Kuo & Shao. 1999
6	Gobiidae	*Gobius* sp.	Sili-sili	Goby	E	Kuo & Shao. 1999
7	Centropomidae	*Lates calcalifer*	Kakap putih	Barramudi	M MS	Blaber. 2000 Kuo & Shao. 1999
8	Leiognathidae	*Leiognathus splendens*	Petek	Splendid ponyfish	M O	Sheaves *et al*.. 2007 Kuo & Shao. 1999
9	Mugilidae	*Mugil cephalus*	Belanak	Flatheat mullet	M O O	Blaber. 2000 Kuo & Shao. 1999 Potter & Hyndes 1999 Vivier. 2010
		Mugil sp.	Belanak	Mullet	MI	
10	Plectorhynchidae	*Plectorhynchus* sp.	Bibir Tebal	Sweetlips	M MI	Blaber. 2000 Vivier. 2010
11	Plotosidae	*Plotosus* sp. *	Sembilang	Eeltail catfish	M O	Blaber. 2000 Kuo & Shao. 1999
12	Pomadasidae	*Pomadasys* sp.	Kapa-kapa	Grunt fish	M MI	Blaber. 2000 Vivier. 2010
13	Siganidae	*Siganus canaliculatus*	Baronang	White-spotted-spinefoot	M	Blaber. 2000
		Siganus guttatus	Baronang	Orange – spotted-spinefoot	M MS	Blaber. 2000 Kuo & Shao. 1999
14	Sigaginidae	*Silago sihama*	Payas	Silver sillago	M O MI	Blaber. 2000 Kuo & Shao. 1999 Vivier. 2010
15	Toxosidae	*Toxotes jaculator*	Sumpitan	Archerfish	F	Blaber. 2000
16	Chaedontidae	*Scatophagus argus*	Kiper	Butterflyfish	E	Kuo & Shao. 1999
17	Scorpaenidae	*Scorpaenopsis* sp.	Lepu	Scorpionfish	M	Blaber. 2000

Remark: F: Freshwater migrant; E: Estuary; M: Marine migrant; MS.: Marine straggler; O: Marine estuarine-opportunists; MI: Marine immigrant.* Source: Focus group discussion

In term of estuary association, fish community was dominated by marine spawner in which some have a part of their life cycle dependent on the estuarine system to complete their life cycle. Those species are *Mugil cephalus*, *Leiognathus splende*r, *Plectorhincus*, *Silago sihama*, *Lates calcalifer*. Adult of *Mugil cephalus* occur widely in estuary and coastal water while they spawn only in the sea. A same pattern occurs on *Lates calcaiver* that spawning in the sea, while the larvae and juvenile in coastal swamp, and the adult in freshwater and estuary (Blaber, 2000). Base on the life cycle distribution, most the juvenile of marine species found in estuary (Table 3). It indicates that Layang River estuary is important role as a nursery of marine fish spawner around Klabat Bay.

From the functional biodiversity point of view, most fishes are benthopelagic and benthic belong to benthoplanktivorous and benthicvorous group. This indicated the importance of benthic zone to support life cycle of ichtiofauna in Layang Estuary. For the example marine spawner *Mugil cephalus*

Table 3. Life cycle distribution and functional biodiversity of fish species in Layang River Estuary.

Family	Species	Life cycle distribution	Functional Biodiversity: Habitat	Functional Biodiversity: Tropic group and food item
Ariidae	*Arius sp* *Arius sagor* *Ketengeus* sp	Adult in estuary and juvenile in the sea	Bp	Piscivorous: Small fish and Benthicvorous : macrobenthic
Ambasidae	*Ambasis sp*	Entire life cycle in estuary.	Bb	Zooplanktivorous : claddocera. copepod. ostracoda. and insect.
Carangidae	*Chorinemus lysan* *Chorinemus sp* *Caranx* sp.1 *Caranx* sp.2	Juvenile in estuary. adult in the sea.	P	Piscivorous
Clupeidae	*Clupea* sp. *Anodontostoma* sp.	Juvenile in estuary. adult found both in estuary and offshore	P	Juvenile: planktivorous Adult: Piscivorous (fish juvenile)
Cynoglossidae	*Cynoglossus* sp.		B	-
Dasyatidae	*Dasyatis* sp.	Estuary & the sea.	B	
Gobiidae	*Gobius* sp.	Entire life cycle in Estuary	B	Zoobenthos
Centropomidae	*Lates calcalifer*	Spawning in the sea. larvae and juvenile in coastal swamp. Adult in freshwater and estuary.	Bb	<80 mm :copepod. ampipod >80 mm : microcrustacean 300 mm : macrocrustacean & fish
Leonagthidae	*Leiognathus splendens*	Juvenile found in both estuary and offshore. adult only in offshore.	Bb	Bentoplanktivore: invertebrate benthos and plankton.
Mugilidae	*Mugil cephalus* *Mugil* sp.	Juvenile. adult in estuary and coastal waters. Spawning in the sea	B	Iliophagus: detritus. diatom. microfauna. smaller meiofauna
Plectorhynchidae	*Plectorhynchidae* sp.		Bb	
Plotosidae	*Plotosus* sp.		P	
Pomadasidae	*Pomadasys* sp.	Spawning in coastal waters. Larvae. juvenile and adult in estuary.	B	Benthicvorous : polychaeta. shrimp. crab. bevalve. stomatopod
Siganidae	*Siganus canaliculatus*	Juvenile in estuary. and adult in coastal waters.		Herbivorous
Silaginidae	*Silago sihama*	Juvenile in estuary. and adult in coastal waters.	Bb	Benthoplanktivore: copepod. benthic crustaceans. pholycaeta and bivalve.
Toxosidae	*Toxotes jaculator*	-		Plant material. insect
Chaetodontidae	*Scatophagus argus*	-	Bb	Herbivorous. zooplankton and Macrobentos
Scorpaenopsidae	*Scorpaenopsis* sp.	-		-

Remark: P: Pelagic; B: Benthic; Bp : Benthopelagic; Source Blaber (2000); Davis. 1985 *in* Blaber (2000); Kuo & Shao. 1999; Sheaves *et al*.. (2007).

which belong to the tropic group of illiophagus that feed on benthic algae (diatom), microfauna, meiofauna, detritus and small organism in or on surface layer of substratum (Blaber, 2000), largely depend their life on the benthic zone habitat of estuary. Therefore, sedimentation from mining activity could influence the degradation of feeding habitat marine migrant fish species.

Some benthopelagic species may also relate to the change of diet of species such as *Lates calcaliver*, *Silago sihama*, *Scatophagus argus* and *Leiognatus splender* (Tabel 3). As reported by Blaber (2000) that the diet of most species change with the growth, as larvae and post larvae the majority are planktivprous then change in food associated with changes in life style. (Davis, 1985) and Datta *et al* (1984) as cited by Blaber (2000) reported the diet of *Lates calcalifer* and *Scatophagus argus* related with change of the length growth of the fish. Small *Lates calcaliver* (< 80 mm) feed mainly on copepod and amphipod then fish in longer than 80 m the diet replaced by macrocustacean and up to 300 mm feed on macrocrustacean and fish.

The importance role of Layang River estuary system as a nursery area and feeding habitat for marine spawner species has to be considered in conservation and management of this estuary in order to support the sustainability fisheries production around Klabat Bay. Most fishes recorded in Layang River estuary have economic value that provides a remarkable income for local people. Those species are *Anodontostoma* sp, *Lates calcalifer, Mugil cephalus, Siganus canaliculatus, Siganus guttatus etc*. The population of *Anodontostoma sp.* has already decreased as reported by local people caused by over fishing. In Layang River estuary *Anodontostoma* was reported found in lower estuary (Sulastri *et al*., 2008). In Matang system, Malaysia, *Anodontostoma chacunda* was found abundance in mangrove channel, and in Pattani Bay, Thailand was found in coastal (Blaber, 2000; Hajisamae *et al*., 2006). The degaradation of mangrove system and sedimantion in estuary around Klabat bay may also damages the habitat of this species. Therefore it should be considered for the concervation and management of fish resources of Layang River Estuary.

CONCLUTION

There was a wide range of salinity during observation. The variation of salinity was related to freshwater run off and ebb tide. Turbidity increased in month representing rainy sesaon. Water temperatur and pH were common for tropical estuary, while DO showed under continue degradation condition. There are 26 fish species dominated by marine migrant that some have a part of their life cycle dependent on estuarine system. From the distribution of life cycle and functional biodiversity point of view, indicate the importance of Layang river estuary to support life cycle of marine migrant species and should be considered in the conservation and management of the fish resource.

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