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# BIODIVERSITY OF FISH RESOURCES IN SUNGSANG ESTUARY, SOUTH SUMATRA, INDONESIA


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## ABSTRACT

Other than as a production area of fish resources, the Sungsang estuary is also used by the surrounding population as a transportation lines and a center of fishing activities. The purpose of this study is to assess the fish biodiversity in Sungsang estuary South Sumatra. The species diversity, evenness, dominance, degree of similarity, and composition of fish communities as well as some physico-chemical conditions were analyzed in order to establish baseline data inventory in Sungsang estuary. Results showed that all of the physico-chemical waters quality parameters in the Sungsang estuary were below the water quality standard, so the physico-chemical parameters were good conditions for the fish sustainability. Forty-eight (48) species of fishes belonging to 29 families from freshwater, brackish water and marine sources were encountered in the water bodies. *Thryssa kammalensis*, *Johnius trachycephalus,* and *Johnius amblycephalus* were a species with relatively high abundance. The index value of diversity classified as moderate (H'=1,477-2,708), The index value of evenness classified as high (J'= 0,616 - 0,876), and the index value of dominance classified as low (D = 0,097 - 0,382). This result showed that the species diversity was good enough, the species spread evenly distributed, no domination and there has a stable community structure. Almost all fish community between the observation locations had no resemblance to each other, except between fish community in the waters around the settlement and species in the shipping channel



**Key words:** Biodiversity, Fish, Sungsang Estuary


## INTRODUCTION

Based on data from the Department of Marine and Fisheries in 2009 until 2013, the number of fishing gear unit operated by fisherman in Sungsang Village from year after year is always increased. In addition to the increase in fishing activities, the increase in population waste, and increased transportation activities in Sungsang Estuary also likely can be a pressure to the aquatic environment, especially fish resources. Based on the interview with the local fisherman, at the beginning only adult fish are caught, but then the small fish are also caught. Nurfiarini *et al* (2015) explains that the species abundance in estuary area can not be separated from the potential of ecosystems in providing space to reproduce, grow and a food source. The purpose of this study is to assess the biodiversity of fish resources in Sungsang Estuary South Sumatera.

## MATERIALS AND METHODS

The study was carried out in June 2015 . The physico-chemical parameters measured were: Temperature, Salinity, DO. pH, Turbidity, Current Velocity, Phosphate and Nitrate. Fish samples were taken using drift gillnet (200 m length and 5 m deep with stretched mesh size of 2 and 3 in ) for 12 hours from morning to evening at each station. Fish samples were analysed for species composition, relative abundance, frequency density, diversity, evenness, dominance, and similarity according to Rilov and Benayahu (2000), Nurfiarini et al, (2015), Okyere *et al,* (2011), Ravanbakhsh (2016), Mondal (2010), Davari (2011), Chao *et al,* (2006), Carles *at al,* (2014).

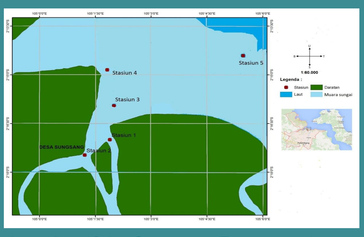


**Fig 1.** Location of the Sungsang Estuary and sampling sites

## RESULTS AND DISCUSSION

**Physico-chemical parameters.** Based on KepMenLH No. 51 Year 2004 and PerGub SumSel No. 16 Year 2005 the physico-chemical water quality parameters (WQP) in the Sungsang estuary are below the WQP, so its good condition for the fish sustainability .

**Table 1. Average of physico-chemical water quality parameters on 5 observation stations**

| Water parameters | Station | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| **Physic** | | | | | |
| Brightness (cm) | 35 | 20 | 7.5 | 27.5 | 120 |
| Temperature ( C) | 29.9 | 26 | 30 | 27.5 | 29 |
| current velocity (m/dt) | 0.21 | 0.52 | 0.17 | 0.31 | 0.33 |
| **Chemical** | | | | | |
| DO (mg/L) | 5 | 5.9 | 9.7 | 7.6 | 11.8 |
| Salinity (‰) | 2.7 | 7 | 21 | 25 | 30.7 |
| pH | 7.5 | 8 | 7.5 | 8 | 8 |
| Phosphate (mg/L) | < 0.002 | 0.004 | 0.003 | < 0.002 | < 0.002 |
| Nitrate (mg/L) | 0.26 | 0.55 | 0.42 | 0.09 | 0.07 |

### Fish Species Composition in Sungsang Estuary

The results of observations in the water of Sungsang Estuary are collected as many as 657 individuals and identified as 48 species from 29 families of fish. Based on habitat, the fish species composition found consists of brackish (23 species), sea (20 species) and the last (3 species) are freshwater species

### Fish Biodiversity

Table 4. Diversity, Evennes and Dominance Index

| Station | Diversity (H') | | Evennes (J') | | Dominance (D) | |
|---|---|---|---|---|---|---|
| | Value | Category | Value | Category | Value | Category |
| 1 | 2,002 | Medium | 0,693 | High | 0,222 | Low |
| 2 | 1,649 | Medium | 0,847 | High | 0,247 | Low |
| 3 | 1,477 | Medium | 0,616 | High | 0,382 | Low |
| 4 | 1,898 | Medium | 0,645 | High | 0,267 | Low |
| 5 | 2,708 | Medium | 0,876 | High | 0,090 | Low |

**Table 5. Similarity Index ($C_s$) of Fish**
(N):not similar S) : similar)

| Station | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| 1 | - | 8,00 N) | 41,38 N) | 32,43 N) | 5,00 N) |
| 2 | - | - | 66,67 S) | 46,15 N) | 6,90 N) |
| 3 | - | - | - | 40,00 N) | 6,06 N) |
| 4 | - | - | - | - | 10,53 N) |
| 5 | - | - | - | - | - |

**Table 3. Fish Species Composition in Sungsang Estuary South Sumatera (**F = Freshwater, E = Estuary, M = Marine)

| Family | Species | | Habitat | Station | | | | | Number of ind | Relative Abundance | | Frequency of Apperance | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Local Name | Scientific Name | | I | 2 | 3 | 4 | 5 | | (%) | Status | (%) | Status |
| **1. Bagridae** | 1. Lundu | *Mystus gulio* | F | 1 | 1 | - | - | - | 2 | 0,304 | Low | 40 | Low |
| **2. Cyprinidae** | 2. Lumajang | *Cyclocheilichthys enoplos* | F | 5 | 3 | 12 | - | - | 20 | 3,044 | Moderate | 60 | Moderate |
| **3. Engraulidae** | 3. Pirang Putih | *Lycothrissa crocodiles* | F | - | 1 | 17 | 6 | 1 | 25 | 3,805 | Moderate | 80 | High |
| **4. Pangasidae** | 4. Patin | *Pangasius pangasius* | F | 9 | - | - | - | - | 9 | 1,370 | Low | 20 | Low |
| | **Sub Total Individual** | | | | | | | | 57 | | | | |
| **9. Cynoglossidae** | 11. Lidah | *Cynoglossus lingua* | E | - | - | 8 | 19 | 3 | 30 | 4,566 | Moderate | 60 | Moderate |
| **10. Leiognathidae** | 14. Pepetek | *Leiognathus splendens* | E | - | - | - | - | 1 | 1 | 0,152 | Low | 20 | Low |
| **11. Mugilidae** | 16. Belanak | *Valamugil engeli* | E | - | - | - | 1 | - | 1 | 0,152 | Low | 20 | Low |
| **13. Plotosidae** | 18. Sembilang | *Plotosus canius* | E | 2 | - | - | 2 | - | 4 | 0,609 | Low | 40 | Low |
| **16. Stromateidae** | 22. Gulama jangt | *Johnius amblycephalus* | E | 69 | - | 1 | 103 | - | 173 | 26,332 | High | 60 | Moderate |
| **18. Triacanthidae** | 27. Duri langit | *Triacanthus biaculeatus* | E | - | - | - | - | 2 | 2 | 0,304 | Low | 20 | Low |
| **19. Chanidae** | 28. Bandeng | *Chanos chanos* | E | - | - | - | 2 | - | 2 | 0,304 | Low | 20 | Low |
| | **Sub Total Individu** | | | | | | | | 382 | | | | |
| **22. Clupeidae** | 36. Bilis teri | *Stolephorus dubiosus* | M | 1 | - | - | - | - | 1 | 0,152 | Low | 20 | Low |
| **24. Drepaneidae** | 39. Daun baharu | *Drepane longimana* | M | - | - | - | 2 | - | 2 | 0,304 | Low | 20 | Low |
| **a. Engraulidae** | 40. Pirang | *Setipinna melanochir* | M | - | - | - | - | 1 | 1 | 0,152 | Low | 20 | Low |
| | 42. Teri | *Thryssa kammalensis* | M | - | - | 108 | 1 | 1 - | 119 | 18,113 | High | 40 | Low |
| **29. Scrombridae** | 47. Tongkol | *Euthynnus affinis* | M | - | - | - | - | 1 | 1 | 0,152 | Low | 20 | Low |
| | **Sub Total Individu** | | | | | | | | 218 | | | | |
| | **Number of individuals** | | | 166 | 19 | 181 | 215 | 76 | 657 | | | | |
| | **Number of species** | | | 18 | 7 | 11 | 19 | 22 | | | | | |

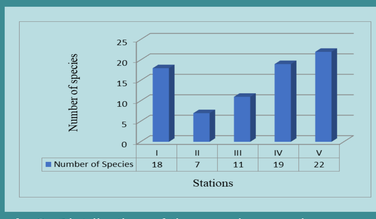


**Fig 2.** Distribution of the species number

Fish communities in Station 5 have the highest diversity index than other station. This is indicated by the existance of brackish fish species (9 species) which also found. It means that the brackish fish species are still able to tolerate the salinity which reached 30,7‰. In contrast to the diversity index (H'), evenness index (J') in each station included in the high category. It means that, species and number of individuals of each species are evenly distributed, stable communities and a high degree of balance community (Gunawan dan Jumadi, 2016; Krebs, 1978; Asriyana et al., 2009). The number of individuals of each species which is evenly distributed also showed no inclination of species dominance. This is also reinforced by the low value of domination index in each station. The results are consistent with the results of Fauziyah et al., (2012) in estuarine waters of TN Sembilang South Sumatera which shown that the structure of fish communities were in stable condition with the number of individuals or species were evenly distributed and no dominance.

Based on the similarity index (Cs), there is only fish species in the station 2 and 3 have in common and the similarity index value is the highest (66%). Whereas fish species in the waters around mangrove ecosystem (station I) and species in fishing ground around stationary lift net have the lowest similarity level of species and included in the non-similar category (Cs = 5%).

**Teri**
*Stolephorus* sp

**Ikan Pari**
*Dasyatis* **sp**

**Duri langit**
*Triacanthus nieuhofii*


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