Fishing Ground and Fish Estimation of Fish Potency of Bengkalis Waters Riau Province

Pareng Rengi, Usman M. Tang and Yusni IkhwanSiregar[1]

[1)]Faculty of Fisheries and Marine Science, University of Riau, Pekanbaru 28 293
*Email: parengrengi@ymail.com

ABSTRACT

A study on fishing ground and estimation of maximum sustainable yield of fish from Bengkalis waters were conducted during October - November 2012. Environmental condition of the fishing ground were examined and analyzed in-situ as well as ex-situ, for physical and chemical properties. The hydroacoustic method (Mitson, 1983) were performed to estimate the presence of fish biomass including pelagic and demersal fish. The fish composition of fish catch were described from fish catch. The proportion of pelagic and demersal fish in coastal waters of Bengkalis approximately 50%-50%. Based on consideration that fishing and natural mortality of 50%, the stock of pelagic fish and demersal revealed 2,1 and 89 tons, respectively. It was suggested that allowed fish catch of pelagic should not exceed 10 pounds/month, providing that fishing period of 12 months. Likewise, the demersal fish should not exceed the amount of 38 pounds/month.

Keywords: fish potency, Bengkalis waters

INTRODUCTION

The development and exploitation of natural resources of coastal waters have been a prime mover for national economic recovery of Indonesia in the last decade. In accordance with the Indonesian government policy to support the regional autonomy, thus the local government are responsible for local management and regulation related natural resources. In fisheries sector, the policy of local government tend to intensively extracted their natural resources for the local economy as well as community welfare reason. This non conservative main set, consequently, the coastal water might have been over fishing which in turn affecting the sustainability of fish landing and social economic of local fishermen.

Located in the East coast of Sumatera, Bengkalis regency consist of several islands, and is in the front of national border with Malaysia.The region has a high biological diversity of the natural resources and ecosystem, therefore, the fishing activities tend increase in the last decade. Published studies indicated fisheries efforts have presumably exceed the maximum sustainable yield. Dinas Kelautan Perikanan Bengkalis (2008) reported that fish potency aof Bengkalis waters account for 276.030 ton/year. However, the fish catch reported 389.280 ton which has exceed the MSY (Nontji, 2004). The present study aim at (1) Studying the characteristic of fish exploitation (2) Estimating fish potency and (3) Identifying and mapping the potency fishing ground within the region.

MATERIAL AND METHODS

The collection of waters for water physical-chemical as wel as biological quality, were taken from several station (Fig. 1). The physical and chemical parameter (in accordance with Kepmen LH No. 51/2004) of water were measured following the APHA (1989).

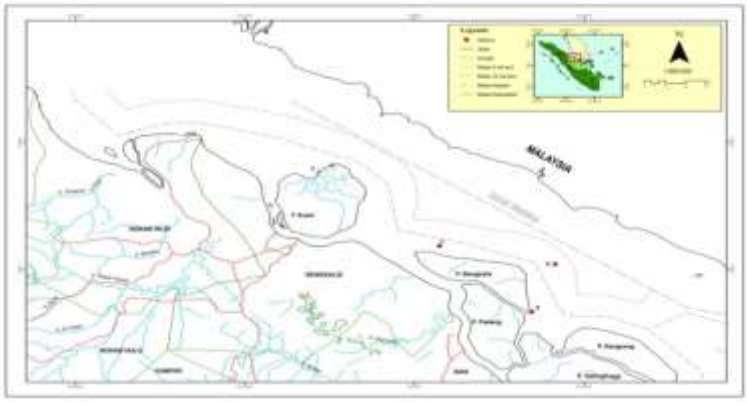

Figure 1. Map of Bengkalis Regency and Sampling Stations.

The materials and analytical methods performed in the study were summarized in Table 1.

Table 1. Physical and chemical parameters and analytical methods performed in the study.

No	Parameter	Unit	Metode analisis	Peralatan
	Physical characteristics			
1	Transparancy	m	Visual Observation	*Seichii Disk*
2	*Turbidity/*	NTU	Sensor	*Horriba Quality Water Checker*
3	*Total Suspended Solid*	mg/l	*Gravimetry*	*Analitical balance*
4	*Temperature*	^{o}C	Sensor	*Horriba Quality Water Checker*
5	Arus	cm/s	Sensor	*Current Meter*
	Chemical characteristics			
6	pH	-	Sensor	*Horriba Quality Water Checker*
7	*Salinity*	‰	Sensor	*Horriba Quality Water Checker*
8	*Dissolved Oxygen (DO)*	mg/l	Sensor	*Horriba Quality Water Checker*
9	PO_4-P	mg/l	*Molybdate complex*	*Spectrophotometer*
10	NO_3-N	mg/l	*Ethylene-diamine complex*	*Spectrophotometer*
	Heavy metals			
11	*Cadmiun (Cd)*	mg/l	*APDC-MIBK extraction*	AAS
12	*Lead (Pb)*	mg/l	*APDC-MIBK extraction*	AAS
	Biological characteristics			
13	Plankton (*phyto and zoo*)	ind/l		Plankton Net

Plankton identification were done following Newell and Newell (1977) and Yamaji (1976), while diatom identification referred to Lakey Drop Macrotansec Counting (LDMC) , plankton abundance following APHA (1992) as shown on the formula:

$$\text{Cell Number/L} = T/L \times V0/V1 \times 1/P \times 1/W \times N.$$

Where;

N : Diatomae count/preparat
T : Area of cover glass (625 mm^2)
L : Area of mikroskopic field (1, 1882 mm2)
V0 : Volume of water in the bottle sample (50 ml)
V1 : Volume of water of cover glass (0,01 ml)
P : Number of observed cells
W : Volume of water (L)

ı-Wiever (H') (Odum 1976) :

$$\text{ɔ}_i \ln(p_i)$$

H' = Diversity Index; Pi = Relative abundance
Dominancy index of phytoplankton were calculated following Simpson (1996),

$$C = \sum_{i=1}^{n} \mathrm{pi}^2 = \sum_{i=1}^{n} \left(\frac{n_i}{N} \right)^2$$

Where; C = Index of Dominancy; Ni = Number of cell –i, ; Ni = Cell Number; N = Total number of cell. Evenness index were calculated following formulaof Crebs, 1985):

$$e = \frac{H'}{\ln S}$$

Where;
e : Evenness Index
H' : Diversity Index and S : Amount of spesies

RESULT AND DISCUSSION

Hydrodynamic (current and waves) condition of Bengkalis water were associated and governed with that of Malacca Strait. The waves, current and win factors were influenced strongly by the pattern of Malacca Strait. The contour of the ocean bottom from the coastline found to be flat with the depth of 25 – 100 m toward the ocean. The surface temperature of water ranged from 28.7-30.33 °C which comparable to that of horizontal distribution of satellite image (Figure 2).

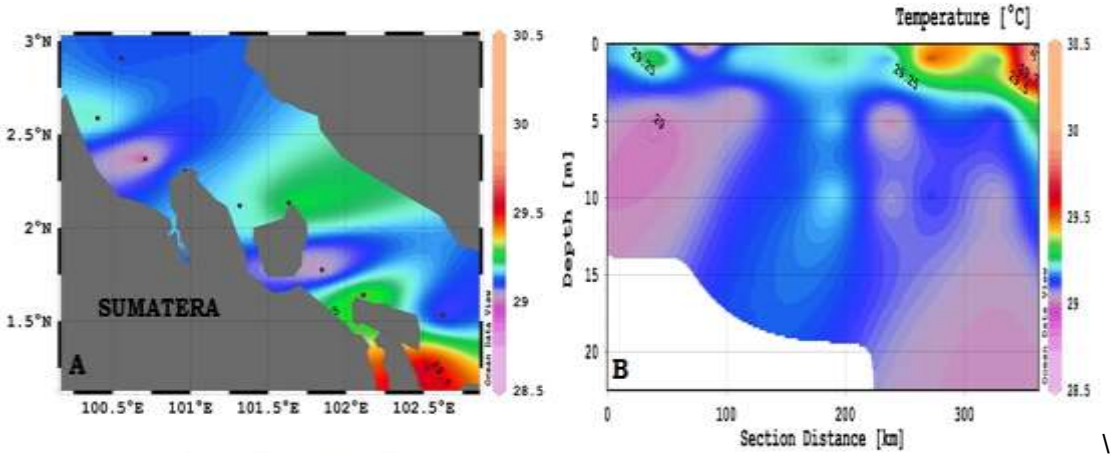

Figure 2. Contour of Current and Wave

Monthly salinity of sea water range from 29,8–31,5‰ with minimum in Desember and maximum in July. Dissolved Oxygen (DO) of waters showed variation which related to temperature, salinity, water turbulences and atmospheric pressure. DO revealed 3,65-8,29 mg/L which reversal with temperature and salinity. Turbidity range from 0–66,4 NTU. Total Dissolved Solid (TDS) appeared from 22 - 28 mg/L which directly correlated with salinity.

Nitrate concentration range from 0 – 1 mg/L which categorized into oligotrophic waters. This condition was natural to ocean and in accordance with quality standard of seawater. Planktonic diatomae were dominated by *Rhizosolenia alata forma gracilima*, *Cerataulina smithii, Pleurosigma salinatum, Thalassiosira gravida* (Figure 3)

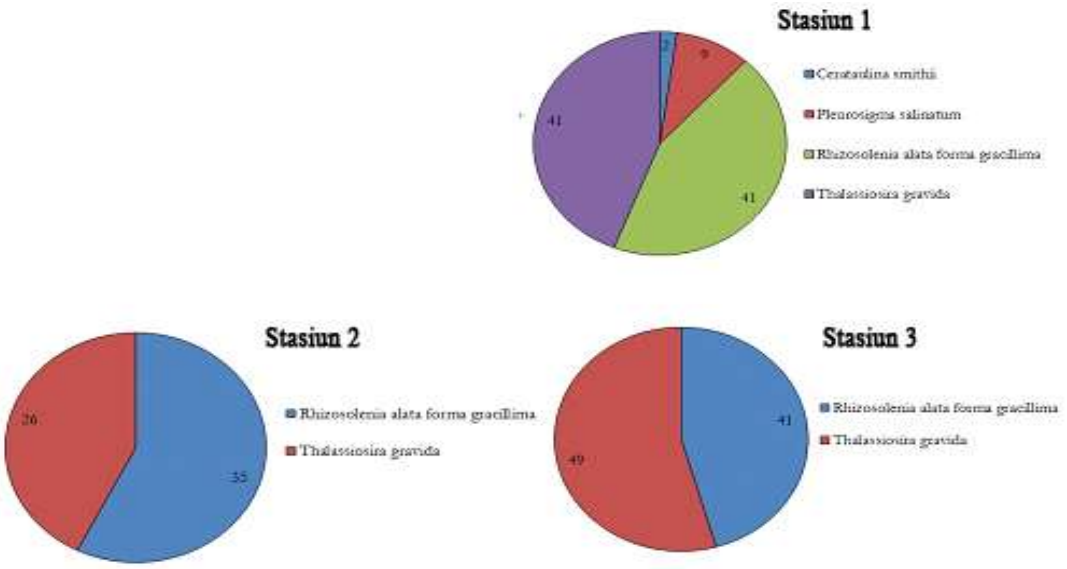

Figure 3. Planktonic diatomae encountered from three station in Bengkalis Water.

Fish Biomass were distributed into two fishing zone: (1) the zone between the islands (Bengkalis Strait) and (2) Selat Malacca zone (Figure 4).

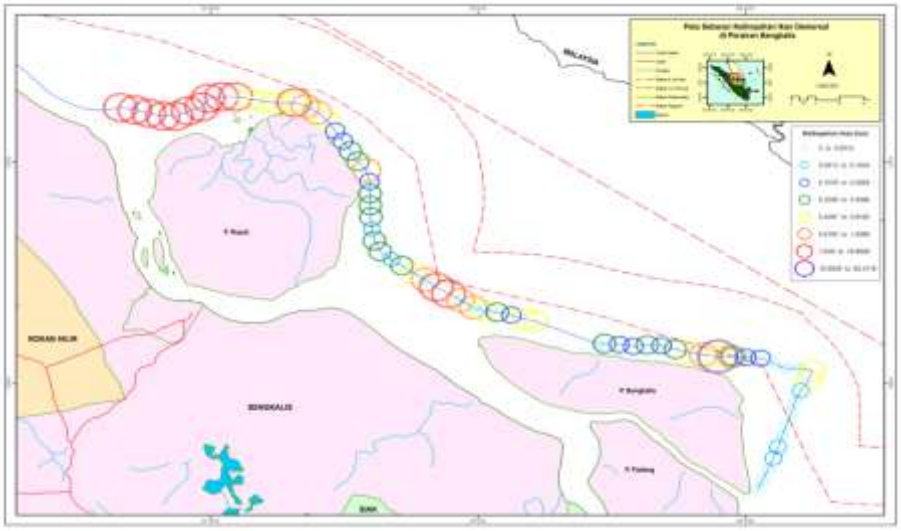

Figure 4. Spatial distribution of demersal in Bengkalis.

The total potency of the two zone were estimated about; 17.886,2 ton/year which consisted of big pelagic fish 1.973 ton/year and 9.544,8 ton/year of small pelagic fish , and shrimps of 738,7 ton/year (Dinas Perikanan dan Kelautan PemKab Bengkalis, 2008). Whereas, fish harvest recorded from Bengkalis revealed 46.063 ton/year (383,8%). Generally, the rate of fishing has been over that of theTotal Allowable Catch, TAC. Based on fish commodity type the big demersal fish, shrimps, has been exploitated 414,9%, 1000,7% of TAC, respectively. Apparently, only the harvested small pelagic fish of Bengkalis water were exploitated 99%.

The high density of fish schooling were distributed along Tanjung Medang, Northern of Rupat and Rupat Strait (Southern of Rupat) (Tabel 2).

Tabel 2. Fish Abundance (Ton) in Bengkalis Waters

	Depth	Abundance (Ton)
1	0 - 5 m	2.8423
		13.9566
		1.0345

4	15 - 20 m	0.9476
5	21 - 25 m	0.4961
6	26 - 30 m	0.8839
7	31 - 35 m	0.669
8	36 - 40 m	0.0992
9	41 - 45 m	0.1651
10	46 -50 m	0.0718
11	51 - 55 m	0.014
12	56 - 60 m	0.0068
13	61 - 65 m	0.0051
14	66 - 70 m	0.0073
15	71 - 75 m	0.0073
16	76 - 80 m	0.0028
17	81 - 85 m	0.0132
18	86 - 90 m	0.0353
19	91 - 95 m	0.0807
20	Demersal fish	89.3152
	TOTAL	110.6538

Tabel 2 showed a very low density of fish biomass in Bengkalis waters. The fishermen in fact tend to harvest the small fish or fingerling fish around the coastal water through the static fishing gear (trap net), thus account for low weight of fish catch. Even though the fish biomass were detected along Bengkalis waters from Rupat island and Bengkalis island, however only small fish were fished. It was suggested that increase in fish effort would brought about the total depletion of fish stock and ecologically was unsustainable. To recover the fish population in Bengkalis waters, the commercial and traditional fishing should temporarily halt. In addition, the application of fishing season would be a wise practice.

CONCLUSION AND SUGGESTION

The research suggest that coastal waters of Bengkalis contain population of small fish which were unsuitable to exploitate. The fish landed in some zone has already been larger than that of Total Allowable Catch, TAC, indicating that the status of coastal water has been over-fishing. Therefore, the local and small scale fishermen should expand the fishing gorund in the off-shore. Alternatively, the fishermen should swift to fish culture activity.

The local authority need to manage the local fishermen to use the fish landing facility to obtain reasonable price of the catch. It is useful tool in controlling fish quote.

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