Case study

Study Case : Productivity of Catched Fish in Locations Around the Construction of Coal Power Plant, Jepara Indonesia

ABSTRACT

The productivity of fishing in marine waters provides an overview of information about the level of the ability of the fishing gear to obtain optimal results. This method is used to determine the average annual marine fishery production by calculating the Catch Per Unit Effort (CPUE), then creating a predictive trend using simple regression analysis. Based on the research results, the modeling trend for total fishery production is y = 221.24 x +4590.1 and the total demersal fishery production is y = 85,631 x + 3737.7 and the total pelagic fishery production is y = 135.61 x + 852.34. The results of the study show a positive trend, this indicates that the fishing productivity in Jepara waters is generally quite good, there has been no decline and the development area of the Tanjung Jati coal power plant B-Unit 5 -6 is not the main fishing operation area for fishermen. so that there is no potential for conflict with fishermen and has no effect on fishing productivity. The results of this research can be used by the Jepara regency government in determining sustainable fishing policies and there is no over fishing in Jepara waters.

Keywords: Productivity, Catch per unit effort (CPUE), Pelagic fishery, Demersal fishery, Fishing ground

INTRODUCTION

The productivity of fishing in marine waters can provide an overview of information to fishermen about the level of fishing gear capability to obtain optimal catch.(1) Information regarding the pattern of the fishing season and dominant fishing areas is very much needed to facilitate fishing operations. Obtaining this information is expected to make fishermen more effective in determining fishing time and reduce the risk of loss from fishing efforts. Apart from that, information related to fishing season can also be used by the government in regulating fishing vessels to avoid overfishing. (2) The productivity of fishing, the determination of the fishing season pattern and the purse seine fishing area for the dominant fish species is obtained by calculating the Catch Per Unit Effort (CPUE) , estimating the fishing season and fishing area of the catch. (3)

Jepara marine waters have considerable marine fish resources, located in the sea waters to the west and north of Jepara Regency, including around the Karimunjawa Islands. The fishing area for pelagic fish is 1,555.2 km², while for demersal fish it is 1,360.8 m². Economic marine fish resources consist of pelagic and demersal fish. There are 23 main types consisting of Manyung, Yellow Tail, Selar, Kuwe, Tembang, Anchovies, Pepetek, Red Snapper, Belanak, Tongkol, Bloated, Tengiri, Coral Grouper, Sunu Grouper, Beronang, Layur, Cucut, Milkfish, Pari, Putih Shrimp, Krosok Shrimp, Crab and Squid. This shows that the productivity of capture fisheries in Jepara waters is

quite productive and and has a diversity of fish species (4)

The characteristics of the diversity of fish resources in Jepara waters lead to fishing by fishermen using various types of fishing gear that are specific to various types of fish in fishing activities (5) The use of fishing gear is adjusted to the species of fish, season conditions and availability of fish resources. Fishing gear that is relatively often used from time to time are fishing lines, traps, arrows, and fishing rods. Several types of fish caught are: catfish (*Pangasius sp*), yellow fish (*Caesionidae sp*), selar (*Selaroides sp*), anchovy (*Engraulidae sp*), peperek (*Leiognathidae sp*), red snapper (*Lutjanus sp*), mackerel (**Scomber sp**), coral grouper (*Cephalopholis miniate*), sunu grouper (*Plectropomus leopardus*), beronang (*Siganus sp*), layur (Trichiurus lepturus), cucumber (Cucumis sativus), flying fish (*Decapterus sp*), stingray (*Batoidea sp*), shrimp white (*Fenneropenaeus merguiensis*), krosok shrimp (*Macrobrachium sp*), crab (*Portunidae sp*) and squid (*Doryteuthis pealeii*) (6)

The fishermen's catch is then landed at the location of the Fish Auction Place (TPI), which is a market where fish / seafood sales transactions are carried out through auctions. The Fish Auction Place (TPI) is usually located at the fish landing port (7) The capture fisheries activity centers in Jepara Regency are located around 12 Fish Auction Points (TPI), are TPI Kedungmalang, TPI Panggung, TPI Demaan, TPI Bulu, TPI Ujungbatu, TPI Mlongo, TPI Bondo, TPI Tubanan, TPI Bandungharjo, TPI Ujungwatu, TPI Karimunjawa, and TPI Bumiharjo. (8)

The fishing ground is a vital location for fishing activities. The effectiveness of fishing by fishermen depends on the carefulness of the fishermen in finding fishing grounds, the technology used, and skills in catching fish. however, until now there has been no adequate data on the location of fishing grounds in Indonesia, including in Jepara Regency, however the government is still pioneering a fishing area information system. (9)

The presence of fish in the physical location of the ground can be estimated by monitoring the distribution of chlorophyll-a, which is a source of fish food. The presence of chlorophyll can be an indication of the abundance of plankton which is a natural food for larvae, juveniles, and small fish, which in turn will also invite larger fish which are the target of fishing by fishermen. (10) The nutrient content provides benefits to organisms in the waters, especially phytoplankton. (11) Phytoplankton are autotrophic microorganisms because they have chlorophyll-a pigments. Therefore, nutrients are used as energy by phytoplankton to carry out the photosynthesis process. The distribution of phytoplankton and chlorophyll-a is influenced by the distribution of nutrient content. Coastal waters generally have a high nutrient content.(12). The distribution of chlorophyll a in the waters of Jepara Regency experiences dynamics which are influenced by changes in seasons. (13).

The existence of demersal fish and pelagic fish in Jepara waters has different characteristics.

Demersal fish do not migrate very far, tend to be at the bottom of the water and are more evenly distributed. Meanwhile, pelagic fish migrate, tend to be in the middle and surface of the waters, and gather (shoaling). Jepara Regency has quite large marine fish resources, located in the west and north of Jepara Regency, including around the Karimunjawa Islands. The area of fishing for pelagic fish is 1,555.2 km² while for demersal fish is 1,360.8 m².(14). The seasonal variability affects the variability of water fertility both temporally and spatially. The water fertility variability then affects the fishing season time and the location of the fishing ground. A good understanding of the timing of the fishing season and the location of the fishing ground will make fishing efforts more effective, time and cost-efficient as well as the optimal result.

This study aims to obtain an overview of fishing trips, capture fisheries production, and to analyze the productivity of capture fisheries (Catch Per Unit Effort, CPUE) in the waters of Tanjung Jati, Jepara Regency. The location of this research is a coal power plant development area

METODE

The research method used is a descriptive method which is a case study. The case of this research concerns the amount of fishery productivity by calculating the CPUE (Catch per Unit Effort) of fishing gear trips in Jepara Regency The data collection method consists of primary data and secondary data. Primary data is data that is obtained directly from the community either through interviews or observations. Secondary data is data obtained from literature from related agencies

Analysis of Capture Fisheries Productivity (CPUE) in Jepara Regency

The CPUE (Catch per Unit Effort) data analysis method and the formula used are as follows: (15)

$$\mathbf{CPUE\ t = Catch_t / Effort_t}$$

Information:

a. CPUEt = Catch per catch effort in year t (kg / trip)
b. Catcht = Catch in year t (kg)
c. Effortt = Fishing effort in year t (trip)

Trend Prediction of Capture Fisheries Productivity (CPUE) using simple regression analysis. A simple regression model can be used to predict the Y value. However, before forecasting, a linear regression model or equation must first be made. $y = a + bx + e$

RESULTS AND DISCUSSION

Based on Jepara Regency Regional Regulation Number 2 of 2011 concerning Jepara Regency Spatial Planning 2011-2031 article 14 paragraph (1-b) states that the plan to build PLTU

Tanjung Jati units 5-6 in Jepara Regency is in accordance with the Jepara spatial plan (Perda Jepara, 2011) and this location is not included in the main fishing area for local fishermen (17)

The area of the main fishing activity (fishing ground) in an area is strongly influenced by the amount of feed that supports fish life and its ecosystem. The existence of distribution of chlorophyll-a as a source of nutrition which is a source of feed can be an indication of the abundance of fish feed sources (18). The potential for fishing areas in Jepara waters is mostly found in the western season, is January and February, and in the eastern season is July and August. The increase in water fertility seen in the west and east monsoons is thought to be the result of an increase in the amount of chlorophyll-a in these waters. The chlorophyll-a concentration is an indicator of phytoplankton, where nutrients help the growth of phytoplankton. (19). Peningkatan ini cenderung disebabkan oleh aliran sungai, dimana perairan Jepara memiliki beberapa sungai yang memungkinkan membawa unsur hara dari darat ke perairan laut. Perairan Jepara memiliki banyak muara sungai yang membawa limpasan yang mengandung unsur hara yang terbawa melalui intensitas hujan yang tinggi.(20) (21).

The map image shows that the redder the color of the waters shows the greater abundance of chlorophyll A so that the area has the potential to be used as a fishing area. Based on these data, the development area of PLTU Tanjung Jati B-Units 5 and 6 is not the main fishing operation area for fishermen, so there is no high potential for conflict with fishermen, as follow: (22)

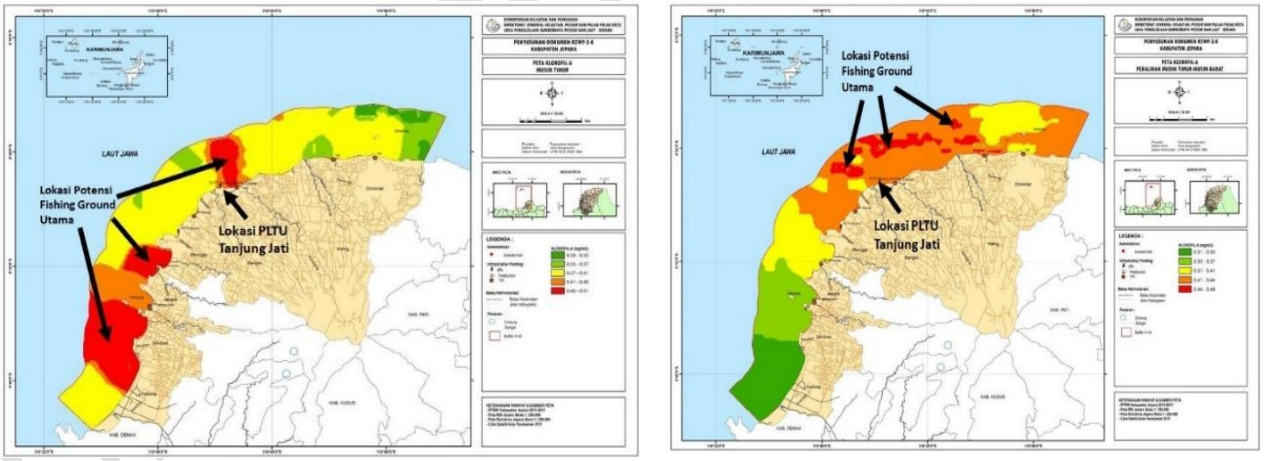

Figure 1. Map of Chlorophyll A in Jepara Regency Waters (1) the East Season (2) the Transition of the East Season to the West Season

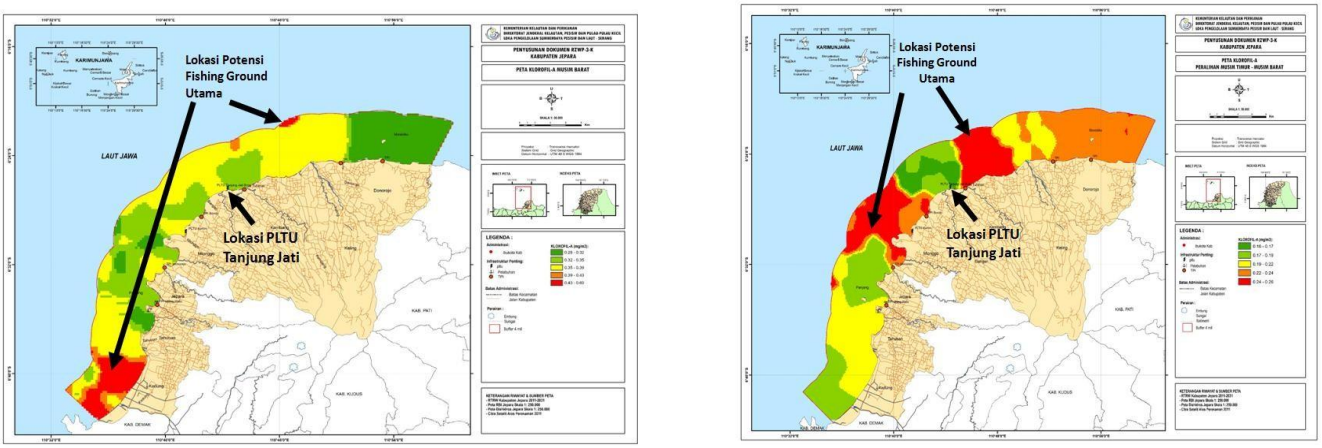

Figure 2. Map of Chlorophyll A in Jepara Regency Waters
(1) the West Season (2) Transition of the West Season to the East Season

Fishery productivity is closely related to the number of fishing gear businesses (trips) in Jepara Regency which tends to continue to increase. This figure is a compilation of the number of demersal and pelagic fishing gear trips (23). The number of demersal fishing trips has an increasing trend, likewise the number of pelagic fishing trips has also experienced an increasing trend.(24)(25) (Table. 1)

Table 1. Development of Number of Fishing Trips in Jepara Regency

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Number of Fishing Trips	**27.820**	**35.738**	**80.791**	**63.386**	**122.250**	**141.165**	**258.014**	**216.810**	**390.498**	**534.488**
Number of Demersal Fishing Gear Trips	**21.715**	**29.945**	**64.739**	**47.359**	**114.240**	**133.597**	**199.492**	**188.289**	**286.916**	**462.048**
Dogol / cantrang	1.386	1.183	10.112	8.086	5.050	12.252	14.670	12.876	10.764	18.360
Beach trawlers / arad nets	6.089	7.671	26.578	13.255	58.285	59.520	53.637	66.030	87.600	87.600
Fixed gill net	6.372	6.825	9.846	8.807	23.816	28.006	66.410	57.295	113.136	90.168
Fixed line	5.519	6.965	14.194	13.092	21.099	25.480	38.978	28.392	4.368	103.296
Bubu	2.349	7.301	4.009	4.119	5.990	8.339	25.797	23.696	71.048	162.624
Number of Pelagic Fishing Gear Trips	**6.105**	**5.793**	**16.052**	**16.027**	**8.010**	**7.568**	**58.522**	**28.521**	**103.582**	**72.440**
Payang	1.519	1.808	1.750	1.750	3.058	2.258	12.084	4.073	11.280	37.036
Purse seine	760	398	1.200	1.175	497	2.594	2.162	2.234	652	312
Gill nets drifting away	1.930	2.385	8.286	8.286	3.905	2.418	14.079	22.080	66.300	33.832
Three-layer net	1.896	1.202	4.816	4.816	550	298	30.197	134	25.350	1.260

Source: Department of Marine Affairs and Fisheries, Central Java, 2014

The number of fishing trips in the Jepara Regency in 2004 reached 27,820 trips/year and increased significantly to 534,488 trips per year. This shows that the fishing effort made by fishermen in Jepara Regency has increased. The result of the linear equation model is that y = 50462x - 90445 has a positive trend, so it can be predicted that the fishing trips of Demersal Fish in Jepara Regency within a certain period of time. The prediction of the catch in 2021 based on the linear equation model results in the number of fishing trips to be 817,871. This will happen if there are no significant environmental changes. as follow (fig 3)

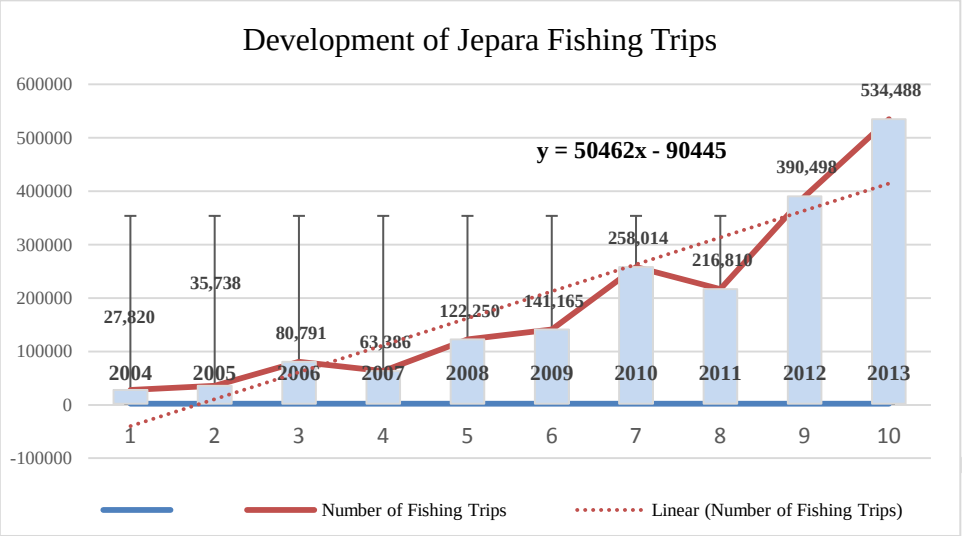

Figure 3. Development of Jepara Regency Fishing Trips

The number of demersal fishing trips experienced an increasing trend during the period 2004 - 2013 where the number of fishing trips reached 21,715 trips in 2004, increasing significantly to 462,048 trips in 2013. The result of the linear equation model is y = 41547x –73676 with a positive trend. Based on this equation model, the prediction of the Jepara Regency Demersal Fishing Trip in 2021 is 674,170 (fig 4)

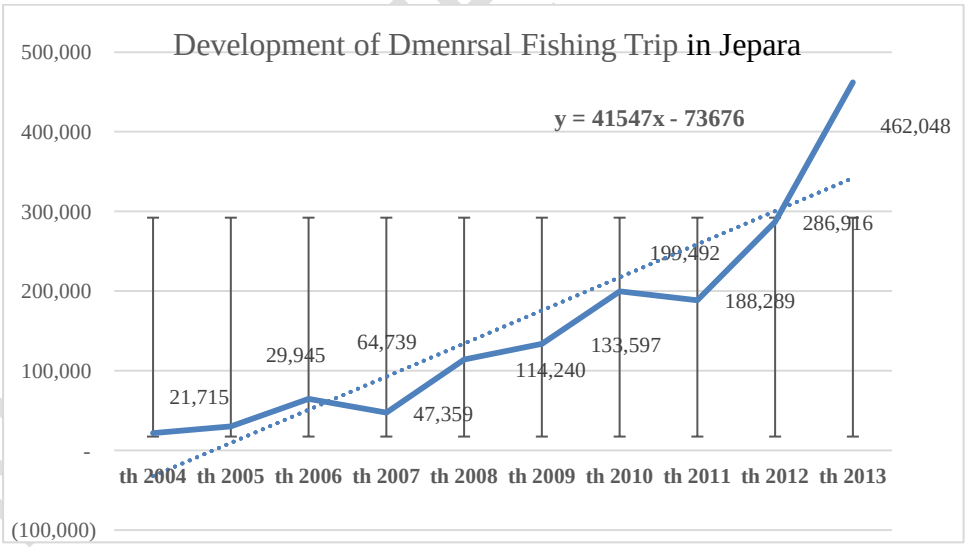

Figure 4. Development of Demersal Fishing Trip in Jepara Regency

The number of pelagic fishing trips also experienced an increasing trend during the period 2004 - 2013 although in 2010 - 2013 the number of trips had fluctuated. The highest number of trips occurred in 2012 where the number of trips reached 103,582 trips per year. The result of the linear equation model is y = 8914.7 x –16769 with a positive trend, so it can be predicted that the pelagic fishing trip in Jepara regency in 2021 is 143,695.6 (fig 5)

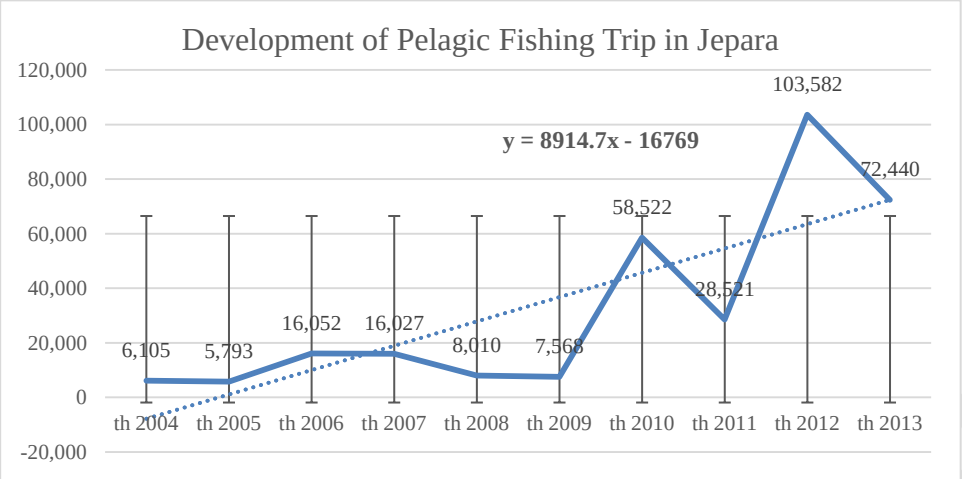

Figure 5. Development of Pelagic Fishing Trips in Jepara Regency

Capture Fisheries Production. In general, the amount of capture fisheries production in Jepara Regency experienced an increasing trend during the period 2004 - 2013. Likewise, the amount of demersal fishery production and the amount of pelagic fishery production also experienced an increasing trend**,** as follow (Table 2)

Table 2. Development of Total Fishery Production in Jepara Regency (in tonnes)

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total Fishery Production in Jepara Regency	4.370,10	5.645,60	5.070,30	4.787,60	5.832,70	5.944,10	6.876,80	7.205,30	6.362,70	5.973,50
Total Demersal Fishery Production	3.574,70	4.412,50	3.747,80	3.388,40	4.444,40	4.225,90	5.096,40	4.938,80	3.996,80	4.261,20
Dogol / cantrang	52,6	904,1	584,6	446,5	152,1	481,9	758,7	671,7	396,2	1.304,70
Beach trawlers / arad nets	3.092,30	2.914,30	2.238,40	1.884,30	3.017,40	2.270,30	2.877,10	3.112,10	2.344,50	1.907,20
Fixed gill net	202,7	243,5	345,4	572,8	796,5	886,6	872,8	695	731,2	554
Fixed line	170,6	282,6	442,3	390,9	362,9	445,2	455,1	324	406,6	361,5
Bubu	56,5	68	137,1	93,9	115,5	141,9	132,7	136	118,3	133,8
Total Pelagic Fishery Production	795,4	1233,1	1322,5	1399,2	1388,3	1718,2	1780,4	2266,5	2365,9	1712,3
Payang	386,1	906,4	476,5	952	1.157,30	672,2	1.024,20	1.353,90	1.815,10	1.161,30
Purse seine	191,3	232,5	414,5	131,8	88,9	700,7	572,2	756,9	414,3	376,7
Gill nets drifting away	198,4	83,2	277,8	289,7	138,3	277,2	88,8	155,7	136,5	174,3
Three-layer net	19,6	11	153,7	25,7	3,8	68,1	95,2	-	-	-

Source: Central Java DKP 2014

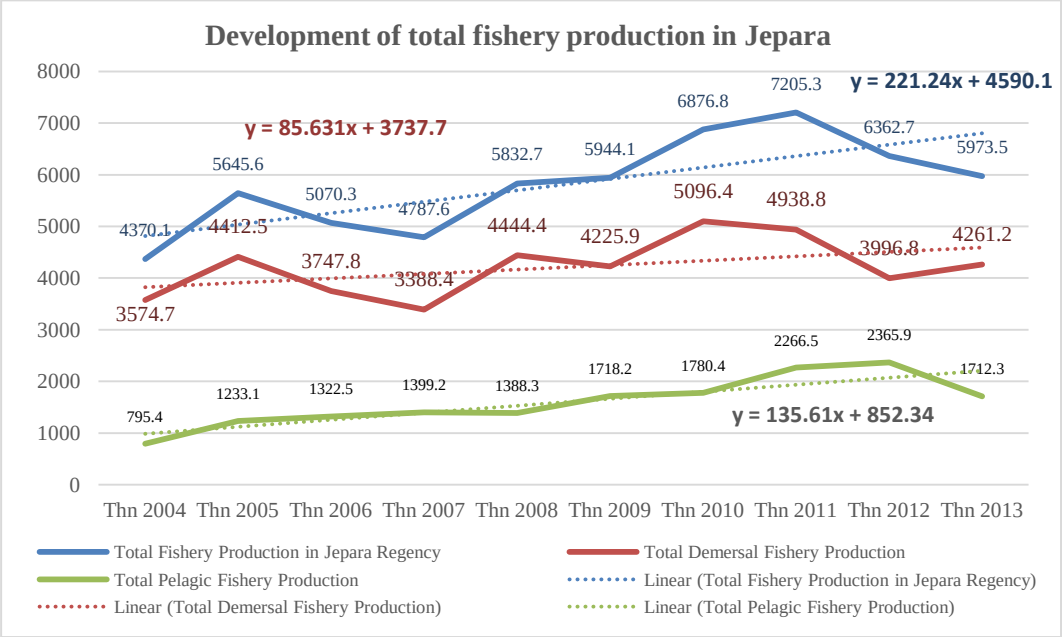

Figure 6. Development of Total Fishery Production in Jepara Regency (in tonnes)

The amount of capture fisheries production in Jepara Regency has experienced a decline from the 2005-2007 period. In 2005 the amount of fishery production reached 5,645.6 tons then decreased the amount of production to 4,787.6 tons in 2007. After that, it increased until 2011 to 7,205.3 tons. In that year, it is the highest production of capture fisheries in Jepara Regency. However, after that the amount of capture fisheries production in Jepara Regency has decreased again, where in 2013 the amount of production became 5,973.5 tons.

The amount of demersal fishery production has a pattern almost the same as the amount of fishery production in Jepara Regency, which, although it fluctuates, has an increasing trend during the period 2004 - 2013. The amount of demersal fishery production in 2004 reached 3,574.7 tons, increasing to become 4,261.2 tons in 2013. The highest amount of production occurred in 2010 where total production reached 5,096.4 tons, however, it is different from the development pattern of the amount of pelagic fishery production which has increased during the period 2004 - 2012, in 2004 the amount of pelagic fishery production reached 795.4 tons, experiencing an increase periodically up to 2012 with the total production reaching 2,365.9 tons. However, in 2013 the amount of pelagic fishery production decreased to 1,712.3 tons.

Based on the data above, it is evident that the fishery production in Jepara Regency tends to increase, increasing for demersal and pelagic fish production. This shows that the operation of the Tanjung Jati steam power plant does not cause a significant negative impact on the quantity of fishery production in Jepara Regency. After the Tanjung Jati steam power plant began operating in 2006 it did not cause a significant decrease in the capture fisheries production of Jepara Regency,

but the capture fisheries production in Jepara Regency actually increased due to the increase in fishing efforts (trips) carried out by fishermen.

Based on the equation model for Total Fishery Production in Jepara Regency y = 221.24 x +4590.1, the total demersal fishery production equation model y = 85,631 x + 3737.7 and the pelagic fishery total production equation model y = 135.61 x + 852, 34. This indicates that the total fishery production, demersal fishery production and pelagic fishery production have a trend positive (no negative trend)

Capture Fisheries Productivity (CPUE) Analysis

CPUE time series analysis can be used as an analysis tool to determine the development of pressure on fish resources, the CPUE trend decreases over time, there is a possibility that fish resources will experience overfishing, this will get worse if the fishing location is further away from the fishing area and the size of the catch per fish tends to shrink.

Table 3 shows the analysis of capture fisheries CPUE value in Jepara Regency, the CPUE value of demersal fisheries and pelagic fisheries CPUE, as follows (table 3)

Table 3. Analysis of Capture Fisheries CPUE in Jepara Regency (on trip)

	Thn 2004	Thn 2005	Thn 2006	Thn 2007	Thn 2008	Thn 2009	Thn 2010	Thn 2011	Thn 2012	Thn 2013
CPUE of Jepara Regency	1,2516	2,3593	0,9256	1,0115	0,7515	1,0546	0,4942	0,8068	0,9632	1,3472
CPUE Demersal Fishery	0,6326	1,2297	0,2425	0,3151	0,1518	0,1436	0,1353	0,1286	0,1648	0,1033
Dogol / cantrang	0,038	0,7642	0,0578	0,0552	0,0301	0,0393	0,0517	0,0522	0,0368	0,0711
Beach trawlers / arad nets	0,5079	0,3799	0,0842	0,1422	0,0518	0,0381	0,0536	0,0471	0,0268	0,0218
Fixed gill net	0,0318	0,0357	0,0351	0,065	0,0334	0,0317	0,0131	0,0121	0,0065	0,0061
Fixed line	0,0309	0,0406	0,0312	0,0299	0,0172	0,0175	0,0117	0,0114	0,0931	0,0035
Bubu	0,0241	0,0093	0,0342	0,0228	0,0193	0,017	0,0051	0,0057	0,0017	0,0008
Pelagic Fishery CPUE	0,619	1,1295	0,6831	0,6965	0,5996	0,911	0,3589	0,6783	0,7984	1,2439
Payang	0,2542	0,5013	0,2723	0,544	0,3784	0,2977	0,0848	0,3324	0,1609	0,0314
Purse seine	0,2517	0,5842	0,3454	0,1122	0,1789	0,2701	0,2647	0,3388	0,6354	1,2074
Gill nets drifting away	0,1028	0,0349	0,0335	0,035	0,0354	0,1146	0,0063	0,0071	0,0021	0,0052
Three-layer net	0,0103	0,0092	0,0319	0,0053	0,0069	0,2285	0,0032	-	-	-

Figure 7 shows the trend analysis of capture fisheries CPUE values, demersal fisheries CPUE trend analysis values and pelagic fisheries CPUE trend analysis values, as follows : (Table 3)

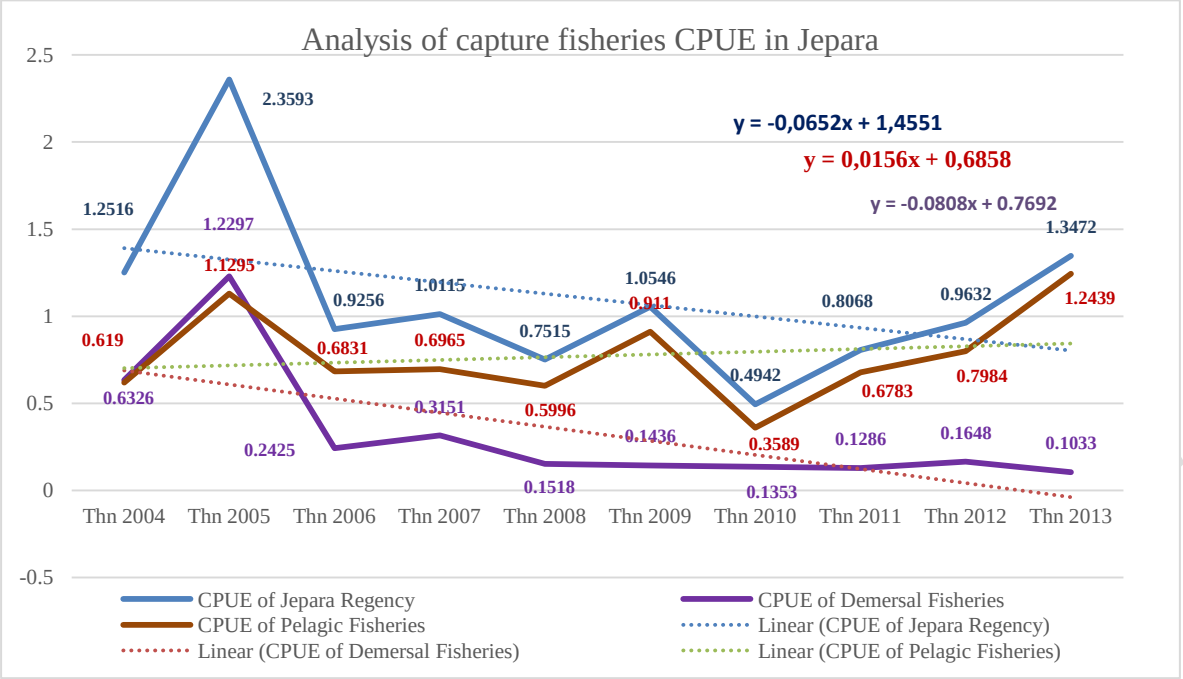

Figure 7. Analysis trend of Capture Fisheries CPUE in Jepara District

The CPUE value of capture fisheries in Jepara Regency fluctuates and tends to experience a downward trend during the period 2004 - 2013.The highest CPUE value was achieved in 2005 with a CPUE value of 2.3593 tonnes / trip, while the lowest CPUE value was achieved in 2010 with a value of 0 , 4942 ton / trip. If it is related to the operation of PLTU Tanjung Jati which has been operated since 2006, the decline in the trend of capture fisheries CPUE value in Jepara Regency is not influenced by operational activities carried out at the Tanjung Jati Steam Power Plant. This can be seen from the fluctuating development of the CPUE value during the period 2004 - 2013, and did not experience a drastic decline between before and after 2006

The trend of decreasing fisheries CPUE in Jepara Regency shows that fish resources in Jepara Regency have been under pressure due to fishing activities. This generally occurs in the waters of the Java Sea (Waters Management Area / WPP 712). The results of a study by the National Commission for the Study of Fish Resources Stock showed that in general in 2013 the conditions of WPP 712 (Java Sea) were as follows:

a) Fully exploited: shrimp (in general), lobsters, demersal fish (including curisi, swanggi, bloso, and gulamah), selar (including small pelagic fish) and squid.
b) Over exploited: Jerbung shrimp, tiger prawns, several types of demersal fish such as turmeric, red snapper, grouper, small pelagic fish (including banyar, and mackerel).
c) Moderate: dogol shrimp, krosok prawns, sea catfish (including demersal fish), tuna and mackerel (including large pelagic fish).

The condition of fish resources in FMA 712 is currently in poor condition. This is supported by the Decree of the Minister of Marine Affairs and Fisheries which states that the fishery potential in WPP 712 currently has a utilization value that exceeds the number, which means that the fishing effort in WPP 712 has reached the fully exploited category. Therefore, it is necessary to reduce fishing effort in FMA 712. One of the causes of overfishing is because fishing pressure that occurs in FMA 712 is dominated by fishing activities. capture small scale. To be able to overcome the high fishing effort carried out, it is necessary to first conduct an analysis of the distribution of the existing fishing units. Therefore, this study aims to determine the distribution of fishing vessels in FMA 712 and determine the optimal number of fishing vessels in FMA 712 based on potential fish resources. (26)

FMA-712 / Java Sea is an area that is experiencing the heaviest pressure compared to other WPP. In general, the CPUE value of demersal fisheries tends to decrease. (27) The highest CPUE demersal value was achieved in 2005 at 1.2297 tonnes/trip. Meanwhile, the lowest demersal fishery CPUE value occurred in 2013 with a value of 0.1033 ton/trip. Based on data on the development of CPUE value in demersal fisheries during the period 2004 - 2013, it shows a decreasing trend, but this is not influenced by operational activities carried out at PLTU Tanjung Jati. It can be seen that after 2006 the CPUE value actually increased.

The productivity of felagic fisheries based on the CPUE value actually experienced an increasing trend even though the development of the CPUE value during the period 2004 - 2013 fluctuated. The trend of increasing CPUE value in pelagic fisheries shows that the operation of the Tanjung Jati coal-fired power plant which has been operating since 2006 did not cause a significant decrease in CPUE for pelagic fish. If you look at the trend above, both pelagic and demersal fish experienced a decrease in production and CPUE in 2010, after that year there was an increase. Therefore, the construction of the Tanjung Jati Steam Power Plant in 2010 did not have a significant regional effect in the Regency. (28)

The construction and operation of the Tanjung Jati coal-fired Pembangikit have more impact on demersal fish production than pelagic fish. Demersal fish CPUE decreased after 2005 and increased after 2006. The construction of the Tanjung Jati Steam Power Plant, Units 1 & 2 began in 2006. The CPUE increase in demersal fish also occurred after 2011, this indicates that the operation of the PLTU has no significant effect on demersal fish production. Demersal fish production since 2004 has experienced an up and down trend, the production trend has increased in 2012.

Based on the trend analysis model trend of Capture Fisheries CPUE in Jepara District, the modeling results are that the total CPUE of Jepara district is $y = - 0.0852 x + 1.4551$ (negative trend), CPUE pelagic fisheries is $y = 0.0156 x = 0 , 6858$ (positive trend) and CPUE demersal fisheries is $y = - 0.08x + 0.7692$ (negative trend). This shows that the total CPUE of Jepara Regency

and CPUE Pelagic fisheries has a decreasing trend, while CPUE Pelagic fisheries is showing an upward trend (fig 7), therefore it needs special attention from the Jepara district government so that CPUE can be increased and over fishing does not occur.

Since the enactment of Law no. 31 of 2004 concerning the Prohibition of Cantrang Fishing Tools larger than 30 GT (gross tonnes), so that efforts to catch fishing gears with a size <30 GT (gross tonnes) are increasing. (29) Since 2007 the use of cantrang <30 GT has increased due to pressure from the fishing community, so that the Head of the Central Java Fisheries Service issued a letter from the Head of the Central Java Fisheries Service No. 523.52-134 dated January 16, 2013 to grant cantrang permits totaling 484 units, this is a policy to prevent a decline in fishery productivity in the waters of the Jepara sea. (30)

CONCLUSION

The construction of the Tanjung Jati Unit 5-6 coal-fired power plant does not have an impact on fishery productivity in the surrounding waters, but in general the Total CPUE of Jepara Fisheries has a decreasing trend, therefore a strict policy on fishing in the Jepara district is required.

DISCLAIMER

All research materials used in this study are commonly used materials, there is no conflict of interest between the author and any party for litigation, this research is only intended for the advancement of knowledge, and this research is financed by the author's personal efforts.

DATA AVAILABILITY

All relevant data has been registered with the supporting file information. This research will help researchers to reveal critical areas related to the productivity of captured fish in locations around the construction of a coal-fired power plant, Jepara Indonesia, to avoid over fishing.

CONSENT

Research is conducted according to the applicable research standards in the Republic of Indonesia, written consent has been collected and retained by the author

ETHICAL APPROVAL

According to international standards or research standards in the Republic of Indonesia, written ethical consent has been collected and kept by the author.

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