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The Impact of the Use of Sodo and Tiger Trawling Gear on Communities in Tambakrejo Fishers' Village, Semarang

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Abstract

Based on the Regulation of the Minister of Maritime Affairs and Fisheries Number 2/PERMEN-KP/2015, sodo and trawlers are fishing gear prohibited from being used, especially by small fishers, because they are not environmentally friendly. However, many fishers still use this tool, one of whom is a fisherman who looks for fish in the waters of Tambakrejo, Semarang, which significantly disrupts the activities of Tambakrejo fishers. This study aims to identify the socio-demographic profile of Tambakrejo fishers, analyze the impact of using sodo and trawlers in Tambakrejo waters, and analyze strategies for handling the effect. This study uses primary data from semi-structured and in-depth interviews. The number of respondents in the study was 60, as determined by the purposive sampling method. This study uses a mixed-methods approach. Quantitative analysis in the form of descriptive analysis is needed to answer the first and second goals. At the same time, quantitative analysis is used to answer the third objective with the help of the Atlas.Ti tool. This study's results show that most fishers use traps and bamboo clumps. The dominating use of sodo and trawlers in Tambakrejo waters has an economic aspect in the form of reduced catches and damage to traps and clusters, as well as social aspects, namely the conflict between Tambakrejo fishers and fishers who use sodo and trawl nets. To deal with this impact, government intervention is needed in the form of water police patrols and strict action against fishers who use sod and trawl fishing gear. The results of this study are expected to be considered in formulating policies, especially fisheries policies.

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INTRODUCTION

Indonesia has a coastline of around 81,000 km. Its sea area covers 5.8 million km2, or 70% of Indonesia's total territorial area (Zakaria, 2015). Abundant marine natural resources are the main commodity for people living in coastal areas. The interaction between the community and the sea is also very high, considering that most of the people's livelihoods are as fishers and not many are in the non-fishing sector (Iis Gindarsah & Priamarizki, 2015; Widayanto et al., 2021).

The fishery is an essential resource for people's livelihood and can potentially be the prime mover of the national economy (Kusdiantoro et al., 2019). In Indonesia, there are 3 types of fisheries businesses, one of which is capture fishing. Capture fisheries have an essential and strategic role in Indonesia, at least it can be seen from three roles, namely a source of economic growth, a source of food, especially animal protein, and a provider of employment (Rizal et al., 2018; Sanger et al., 2019; Triaso, 2012). In general, capture fisheries are synonymous with sea catches produced by fishers. Figure 1 shows data on the capture fisheries production for 2017–2019, which shows high marine catches in Indonesia. Marine capture fisheries in Indonesia continued to increase from 2017 – 2019. This shows that there is uncontrolled exploitation of fish resources (Atmaja et al., 2011).

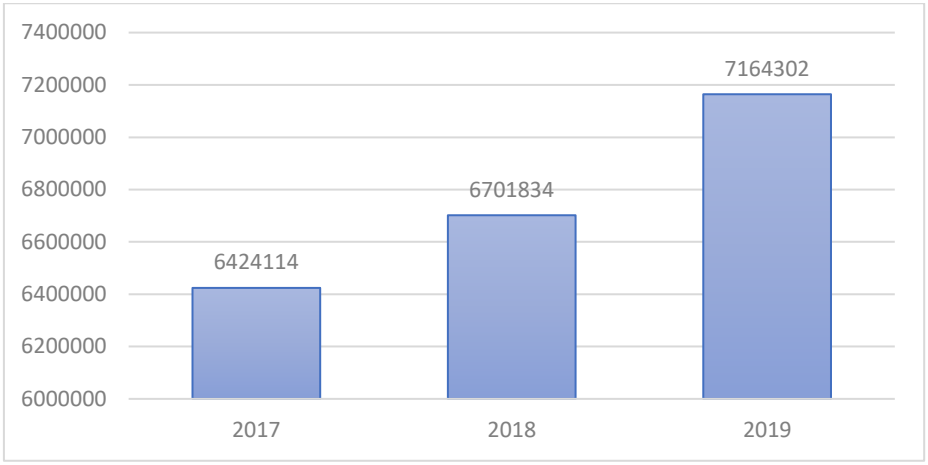

Figure 1. Number of marine catches in Indonesia, 2019
Source: BPS processed (2023)

It is impossible to separate the role of fishers from the high yields that Indonesia has achieved. Coastal communities that rely on fishing for their livelihoods make up the majority of the population in coastal areas. Fishers in coastal communities consist of traditional fishers and machine fishers (high technology). Traditional fishers are fishers who use traditional and simple fishing gear such as nets, fishing rods, traps, and others. Whereas machine fishers are fishers who use high-tech fishing gear such as trawl trawls, purse seines, trawls, and trawlers (Setyadi, 2014). The fishing gear used by traditional fishers is usually. The use of fishing gear is one of the influences on the sustainability of aquatic resources (Salim et al., 2019). *Sodo* fishing gear (push net) is a fishing gear that uses nets, the use of *sodo* (push net) is an act that is prohibited by the government. The adverse effects of using trawlers will cause damage to natural resources, such as damage to coral reefs, threaten the extinction of fish in the sea, and harm traditional fishers (Ananda et al., 2019).

Banning fishing gear that is not environmentally friendly is an effort to save the environment and control overfishing (Handayani & Lituhayu, 2019)). Preservation and prevention of damage to other biota because the damage has a broad impact on existing ecosystems. Mistakes in anticipating the development of fishing gear also led to the extinction of fishery resources (Radarwati et al., 2017). Environmentally friendly fishing is the use of fishing gear that does not have a negative impact on the environment, for example, by causing damage to the water bottom or pollution. A further factor is

the impact on biodiversity and resource targets, namely production composition, bycatch, and juvenile fish caught by accident (Hanafi et al., 2019; Rasdani, 2005).

Tambakrejo Fishers Village is a coastal area in North Semarang where the majority of the population work as fishers (BPS, 2020). Fishers in Tambakrejo Fisherman Village have, until now, caught fish with tools such as trawls and *sodo*. Fishers who use *sodo* tools, for example, are Tambak Lorok fishers, Demak fishers, and Kendal fishers. The use of *sodo* and trawl tools certainly has an impact on the marine ecosystem as well as the socio-economics of surrounding fishers who use environmentally friendly tools, such as the Tambakrejo fishers. The catch results obtained by Tambakrejo fishers and fishers who use soda are very different. This is due to the use of different fishing gear. The use of fishing gear is also troubling the Tambakrejo fishers.

Therefore, this study aims to analyze the characteristics of fishers in Tambakrejo Fishers' Village; the existing condition of fisheries in the Tambakrejo fishing village, identify problems that arise from the use of fishing gear that is not environmentally friendly, namely trawlers and *sodo*, and analyze the socio-economic impacts that arise from the use of these tools on the lives of fishers in Tambakrejo Fishers' Village.

METHOD

This research took place in the northern coastal area of Central Java. The study was conducted in Fishers's Village, Tambakrejo, located in Semarang Regency, in the North Semarang area. The data used are primary data collected using interviews, questionnaires, and in-depth interviews. Respondents were selected by purposive sampling; as many as 60 fishers and key informants were selected as stakeholders from the academic-business-government-community (ABGC) element. Respondents were residents of Kampung Nelayan, Tambakrejo. Data was taken in October–November 2022.

This study uses a mixed-methods approach that combines quantitative and qualitative analysis. Quantitative analysis in the form of descriptive statistics was used to answer the first objective, namely identifying the socio-demographic profile of the respondents, and the second objective, namely the respondents' impact from using sodo and trawling gear in Tambakrejo, Semarang. While the third goal, handling the effect of fishers using sodo and trawling gear in the Tambakrejo area—was answered using qualitative analysis based on in-depth interviews with informants using Atlas.Ti. Figure 2 below shows a map of the location of this study.

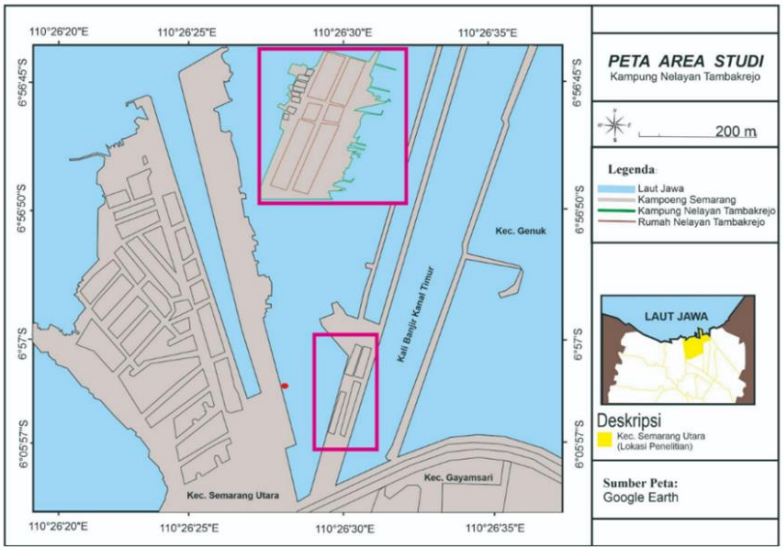

Figure 2. Map of the location of the research location

RESULT AND DISCUSSION

Socio-Demographic Profile of Respondents

Respondents in this study were fishers in Tambakrejo Fisherman's Village, Semarang. Table 2 below shows the socio-demographic profile of the respondents.

Table 1. Respondents' Socio-Demographic Profiles

Variable		Frequency	Presentase	Frequency distribution	
Ages	< 30	4	6,67	Mean	43,55
	30 - 40	21	35,00	Min	27
	41 - 50	19	31,67	Max	63
	51 - 60	15	25		
	>60	1	1,67		
Level of education	No School	2	3,33	Mean	Primary School
	Primary School	47	78,33	Min	No School
	Junoir High School	8	13,33	max	Senior High School
	Senior High School	3	5		
Marital status	Not married yet	0	0		
	Are/have been married	60	100		
Job status	Ship owner	24	40		
	The Crew	36	60		
Catching tool	Bubu	37			
	FADs	12			
	Rames Net	11			

Source: primary data processed, 2023

Fishers in the Tambakrejo Fisherman Village are mostly educated at the elementary school level. Most fishers are in the age range of 30–40 years (35%) and 41–50 years (31.67%), with the average age of fishers being 43–44 years old. This shows that the majority of fishers are in a productive period. All fishers are in married status, and the majority of fishers have employment status with 36 crew members (60%).

They become fishers because their parents are fishers, so they continue as fishers because they have been taught how to go to sea from a young age and for other reasons because of competition for jobs. They do not get jobs, or work is less productive, so they finally choose to go to sea and become fishers. Of the 101 family members who work as fishers, around 60 people work as fishers, and the others work in other fields. The size of the ship used by the respondent is 1 GT, and the duration of the respondent's long voyage is less than 1 day.

The fishing gear fishers use in the Tambakrejo Fisherman Village is mostly the same, including rames nets, trap traps for dragons, and bamboo clumps from the fishing gear used to win different types of catches. Most respondents had trap fishing gear, namely 37 respondents; then as many as 12 respondents used bamboo clump fishing gear; and 11 used rames net fishing gear. Trap fishing gear is used to catch shrimp. Meanwhile, bamboo clump fishing gear is used by fishers to capture or cultivate green mussels.

The Impact of Using *Sodo* and Tiger Trawling Gears

The sea waters around Tambakrejo Fisherman's Village are free. This makes fishers from other areas, such as Tambak Lorok, Kendal, Demak, Morosari, and other regions, look for fish in the area. However, these fishers use *sodo* and trawl fishing gear. Based on RI Maritime Affairs and Fisheries No. 2 of 2015, both *sodo* and trawl fishing gear are prohibited fishing gear. The use of *sodo* and tiger fishing gear disrupts and damages the sustainability of fish resources in Indonesian territory (Tampubolon, 2019). In addition to environmental impacts, the use of *sodo* and trawling gear has an effect on fishers in Tambakrejo. In Figure 2, the impact on the existence of fishers who use *sodo* and trawl fishing gear in the Tambakrejo area is based on the respondent's perceptions.

Table 2. Respondents' Perceptions of the Impact of Using *Sodo* and Tiger Trawling Gears

Aspect	Vulnerability Indicator	SD (1)	D (2)	N (3)	A (4)	SA (5)	Amount (wght x freq)	Average
Economy	Catches decreased	0	0	8	17	35	266	**4.44**
	Decreased income	0	30	0	30	0	181	3.02
	Damaging the traps/FADs	0	11	0	0	49	267	**4.44**
	Average							3.97
Environment	Damaging coral reefs and other marine life	0	0	43	13	4	201	3.35
	The number of fish is reduced	0	0	6	20	34	268	**4.47**
	Average							**3.91**
Social	There was a conflict with the fisherman who used the *sodo*/tiger trawler	0	12	0	48	0	216	**3.59**

*note: SD (strongly disagree); D (disagree); N (netral); A(agree); SA (Strongly agree)

Source: primary data processed (2023)

Table 2 shows the respondents' perceptions of the impact of using *sodo* and trawling gear in Tambakrejo waters. Based on the economic aspect, the most dominant effect felt was decreased catches and damage to the traps and FADs due to the *sodo*/trawler fishing gear. The use of trawlers by fishers from the ponds of Lorok and Kendal and other fishers who go to sea in the same area as fishers in the Tambak Rejo Fisherman's Village resulted in a significant decrease in catches compared to before and now. Before 2015, their yield ranged from 15–100 kg, dropping to 1–10 kg. This was due to damage to fishers's nets, and most of the small and large fish were netted by trolls, which caused their catch to decrease drastically. The table below shows the percentage decrease in catches from fishers in Tambak Rejo fishing village. This was stated by one of the respondents during the interview.

> "*…Yes, now the income has decreased, ma'am. The fishers who use this sodo start looking for fish here, right around 7–10 of them. In the past, the catch was 15–100 kg. How much is it now, 10 kilos? It's hard now to find fish here, Ms."*

Catches such as crabs, blanak fish, tuna, mackerel, blanak, and nine are rare if they get very few. Crabs that used to reach 15 kg, now only weigh 1-2 kg, while snapper fish that used to reach 8-9 kg can now only weigh 1-2 kg. This was revealed by one of the respondents.

> "*Now you can just get fish like this, Ms. Just a little. In the past, you could get fish like tuna and mackerel; now it's hard to get, Ms."*

Using fishing gear *sodo* and trawlers damaged fishers's trap nets and bamboo FADs. The tiger fishing gear is operated by pulling it over a long distance to catch fish in the area it is traversing. And they are also scratching the *sodo* fishing gear by pushing, where the net is placed in front of the boat. This resulted in the FADs and traps installed by local fishers being carried away by *sodo* and trawlers. This is like the statement of one respondent when interviewed, as follows.

> *"This is you, miss, so it's like this. My trap net is broken like this. Yes, I have to fix it. Yes, that's the cost too, Ms It's still getting better, even miss, a lot of my bubu is missing. When I was about to take it, it was not there anymore. Ms Yes, it seems to have been carried away by the trawl net.."*

Based on environmental aspects, the impact of using *sodo* and trawling gear that dominates is the decrease in the number of fish. This is reflected in decline in the catch of fishers. The use of the trawling equipment is due to dredging the bottom of the waters and using small meshes to catch juvenile fish resources (Suryawati & Pramoda, 2017), so the government prohibits this fishing gear through the Minister of Maritime Affairs and Fisheries Regulation Number 12 of 2015 against the prohibition of trawling gear.

Based on the social aspect, the impact felt by using *sodo* and trawl fishing gear in Tambakrejo waters is the occurrence of conflict. This conflict occurred between Tambakrejo fishers and fishers using *sodo* and trawlers from other areas. This conflict arose due to the detrimental impact on Tambakrejo fishers, like the decrease in the catch, which reduced their income. Coupled with the loss or damage of traps or bamboo clumps by Tambakrejo fishers, they are not happy with the existence of fishers who use *sodo* and trawlers in Tambakrejo waters.

Handling the Impact of Fishers Using *Sodo* and Tiger Trawling Gear in the Tambakrejo Region

The existence of fishers who use trawlers and *sodo* who look for fish around Tambakrejo has caused conflict. Fishers The Tambakrejo fishing community uses fishing gear based on each type of fish caught and the type of season. The majority of Tambakrejo fishers use fishing gear and bamboo clumps. So that the existence of fishers using *sodo* and trawling gear greatly disrupts their activities. Even *sodo* fishing gear is still used because, according to the Tambakrejo fishing community, only *sodo* fishing gear can quickly catch large amounts of shrimp (Ghaisani & Astuti, 2020). The existence of fishers using *sodo* and trawling gear in Tambakrejo waters has caused conflict with local fishers.

For this reason, resolving conflicts that occur in Tambak Lorok is through deliberation, mediation, and effective communication. More significant losses will be if you continue using non-environmentally friendly fishing gear. In addition, the active involvement of stakeholders is also stated by fishers as necessary in reducing conflict. This is because each stakeholder is all actors or groups that affect and/or are affected by a program's policies, decisions and actions (Mafruhah et al., 2020; Oktavia & Saharuddin, 2015).

The decrease in catches and income due to using non-environmentally friendly fishing gear in Tambak Rejo Village made some fishers start looking for side income, such as stone labourers, hairdressing service providers, and others. Some others who are not looking for a side job can only surrender and hope for a solution from the government and officials in controlling this non-environmentally friendly fishing gear.

The fishers have hopes and messages for the government and the whole community, especially those who work as fishers. It is hoped that fishers who use illegal fishing gear such as trawlers and *sodo* will be dealt with firmly, because it can be detrimental. This loss includes environmental losses (Campbell et al., 2018). The existence of this prohibition which is strictly enforced is related to the impact of the use of fishing gear that is not environmentally friendly; besides being dangerous, it can also damage the marine ecosystem (Sinta, 2018) through the deployment of the water police to overcome the use of *sodo* and trawling gear in Tambakrejo waters. Then, fishers hope to be given

alternative fishing gear that is environmentally friendly but with high economic results so that they can match the income when using trawlers and *sodo*. Then next is law enforcement from the government to overcome illegal fishing, using prohibited fishing gear, and hoping for an adequate water patrol. In the end, if these obstacles can be overcome properly, it is hoped that they can change the lives of fishers from vulnerable to becoming viable (Nayak & Berkes, 2019).

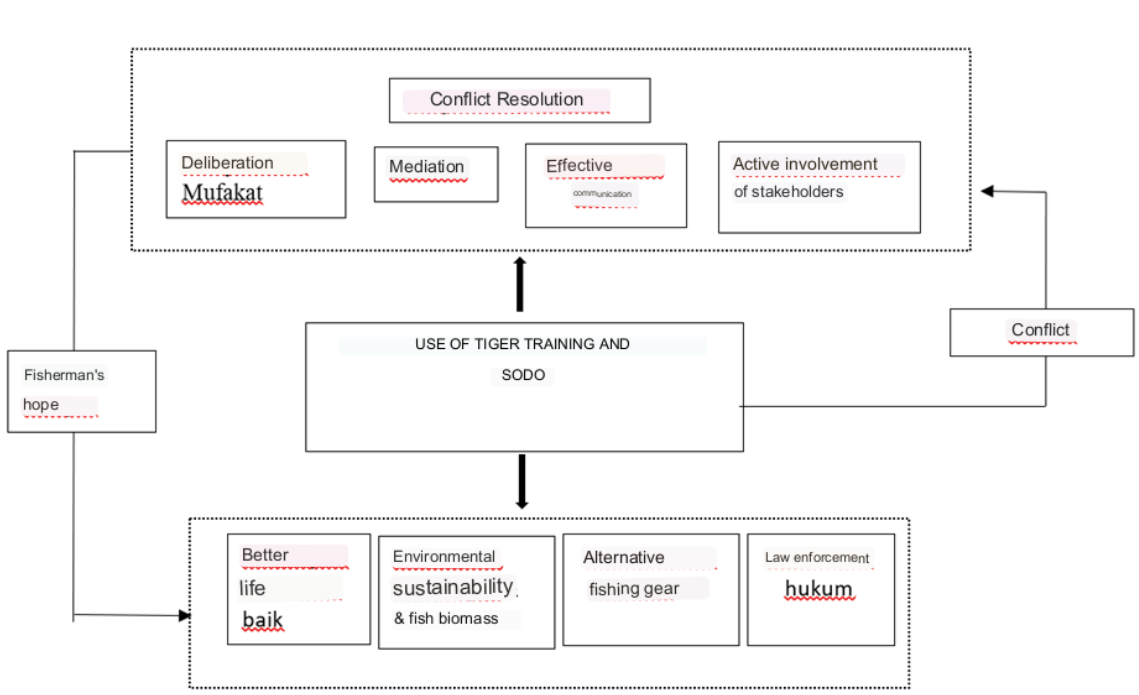

Figure 3. Efforts to deal the impact of using *sodo* and trawling on Tambakrejo fishers

CONCLUSSION AND RECOMMENDATION

The majority of Tambakrejo fishers are fishers using traps and bamboo groves to find fish. Thus, fishing gear such as *sodo* gear and trawlers is felt by the people of the Tambak Rejo Fisherman Village, especially regarding economic and social aspects. It can be seen that this is the case in terms of the economic aspect of the decline in catches and their income that occurs as a result of the use of fishing gear that is not environmentally friendly because this fishing gear can damage marine biota that is passed by the *sodo* and trawling gear that are stocked or used by fishers. Who uses it. Therefore, many fishers are looking for side jobs such as stone labourers, barbers, and others that can be used as side jobs to help with their daily needs as fishers. This impact then makes the interaction of local fishers with fishers who use *sodo* and trawlers wrong, and conflict occurs.

Therefore, facing the use of tools that are not environmentally friendly, fishers respond with various attitudes. In this case, fishers are temporarily gathering and holding discussions with the Joint Business Group (KUB). Tambakrejo fishers hope there will be firm government efforts to control the use of *sodo* and trawling gear, especially in Tambakrejo waters. Fishers hope there will be water police who will continue to guard and supervise these waters from users of *sodo* and trawling gear. This is so that Tambakrejo fishers get many catches and increase income.

The results of this study are expected to be a material consideration for policymakers. In addition, development related to this research also needs to be carried out for future researchers by completing a quantitative analysis regarding the impact of using *sodo* and trawling gear.

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