

The Social Relationship of Traditional Fishermen with Electric Steam Power Plant at Suralaya Banten, Indonesia

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ABSTRACT

Industrial development is one factor changing the ecosystem, causing fishermen to experience a shift in fishing areas. The purpose of this study was to determine the social relationship between the fishing community near the Electric Steam Power Plant (ESPP) Suralaya, Banten Province, Indonesia. The research was conducted using qualitative exploration methods. Primary data collection was carried out through participatory observation, in-depth interviews, documentation, and Focus Group Discussion. Members of the fishing community and Suralaya power plant officers participated in the study. The results showed that traditional fishermen who lived in the Suralaya region since the 1950s are continuing fishing in the midst of ESPP Suralaya construction which was carried out in four stages from 1984 until 2011. The existence of a power plant causes climate change in coastal areas, especially in the immediate vicinity. Since 2019, the Suralaya power plant has prepared a boat landing site for fishermen as part of its corporate social responsibility. Institutionally, ESPP Suralaya provides educational and religious assistance to the communities surrounding the ESPP development. Institutional social relations in the environment agree to protect each other in the area of catch to remain free from industrial waste. Fishermen are advised not to make catch in the red zone area designated by the Suralaya power plant.

KEYWORDS: environment, ESPP area, fishermen, social relations

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1. INTRODUCTION

Industrial development in coastal areas, naturally, affects lives of fishing communities (Bebetido et al 2020). The Suralaya area has a fishing community as a source of livelihood by relying on seafood. Because of industrial development, the cultural environment has shifted in terms of the time for fishing or catching. Industry will affect the local ecosystem and marine culture (Horton & Hunt 1984). In addition, there was also a change in the catching area after construction of the Suralaya power plant due to environmental impact.

Plans for power plant construction should include stakeholders' participation to understand the plant's impact on all marine sectors (van Ingrid et al 2014). According to Frawley et al (2019), important factors in determining cultural models are demanded that fishermen understand and respond to change occurred. Finally, attention is given to fisheries governance challenges the movement poses to integrated management. Power plant construction can change fishermen's welfare and activities (Wulandari et al 2018). A more systematic investigation of how institutional barriers affect the distribution of local ecological knowledge will help inform ecosystem-based approaches to fisheries management (Farr et al 2018). According to Sari

& Hadi (2018), the construction of a similar power plant in Semarang, Central Java, has caused climate change on the coast of the city of Semarang, in which one of the indicators is the occurrence of sea rise which reaches 0.8 mm/year and the average land degradation, ranging from 5 to 12 cm/year, affects most of the coastal communities, not only in terms of social life but also the region's agriculture since its economy depends on increasingly uncertain resources.

Holbrook & Johnson (2014) states that power plant construction must include estimates of the effects of current and future climate change, and consider obstacles and adaptation options for fisheries management over the short-term planning horizon of 5–7 years. Productive fishermen have better physical abilities to make optimal catches for their families' welfare and meet their household needs (Rahmet al 2014). They use the network to get information and access to resources they need to survive (Pamungkas 2018; Asmawati et al 2020). According to Abu Samah et al (2019), adaptation strategies must be adjusted to the fishermen's needs, interests, and abilities.

Fisherman culture has a great influence on the cultural identity of coastal communities as a whole (Young et al 2019). Every change will have

social and cultural impacts. In addition, cultural changes will also affect the economy. Industrial development can absorb labor and can also contribute to supporting the activities of the surrounding community. Complex, interrelated elements are important factors shaping the relationship between fishermen and their cultural landscape (Khakzad 2016). Therefore, organizational restructuring of joint management, clarification of ownership rights, and development of ecosystem-based approaches are needed (Symes 2007).

The ESPP Suralaya is one of the main power plants to supply electricity to the western part of Java. The Suralaya power plant, with a capacity of 3,500 Megawatts (MW), serves as a provider of 25% of Java's and Bali's electricity needs. Meeting this demand would require approximately 32,000 tons of coal per day. The construction of the ESPP Suralaya, which now has seven units, is to be worked on in four stages. First began in 1984, then the second phase in 1989, the third phase in 1997, and the fourth phase began operations in 2011. The Suralaya PLTU began operating in 1985. The ESPP Suralaya is located in the Pulo Merak District, Cilegon City, occupying an area of more than 240 hectares, and on the coast of Pulo Merak and Suralaya.

Fishing communities have existed in the village of Suralaya for a long time, and the tradition has been passed down through generations. Although there are no facts or data recorded, one fisherman reported that fishing villages had been in the area since the 1950s, before development began in the 1980s. A traditional fisherman experiencing changes due to industrial development requires a survival strategy, including expanding the fishing area.

This research focuses on traditional fishing communities in the Suralaya power plant construction area. This study aims to uncover and analyze the communities' shifting characteristics since the Suralaya power plant began operations and the communities' socio-economic living conditions since the plant was built. In addition, the study reviews interactions between traditional fishing communities and the ESPP Suralaya in Banten, Indonesia.

2. Research Methodology

This research uses a qualitative case study approach conducted on traditional fishing communities that are directly affected by construction of the ESPP Suralaya, Banten, Indonesia. According to Creswell (2010) case studies are research strategies in which researchers carefully investigate a program, event, activity, process, or group of individuals. Informants are determined

purposely and are used to look for the expression of meaning and essence.

Data collection techniques used in this study were through the method of observation, interviews, and documentation. Traditional fishermen were observed to determine field conditions. Interviews were conducted by visiting the fishermen's landing site and meeting with 11 informants who had been determined. Informant selection was based on age, length of time as a fisherman, and boat ownership. Two informants were also selected from Suralaya PLTU management. Informants were interviewed individually to triangulate informant data sources. In addition to the individual interviews, a group focused interview was also conducted with the informants to determine the validity of data from various sources before drawing conclusions. Some related documents were taken, such as notes and documents relating to interaction between the Suralaya power plant manager and the traditional fishing community. Data analysis, namely reduction through a rough data selection cycle, focusing on simplification and transformation of field data, data display, is a collection of structured information for drawing conclusions, and conclusion drawing/verification were completed to match data validity.

3. RESULTS AND DISCUSSION

3.1. Characteristics of Fishermen in the ESPP Area

Fishing communities, as social entities, usually live, grow, and develop in coastal areas (Ginkel 2007). In terms of social construction, communities in coastal areas are part of the fishing community. Many, but not all, coastal community members usually work as fishermen, fish farmers, or aquaculture farmers (Young et al 2019).

Coastal community members in Suralaya and Pulo Merak prefer seafaring and agriculture. Those who do not work as fishermen and farmers are employed in the industrial sector. Industry workers may be part-time fishermen during industrial holidays, and farmers may fish if there is no arable land or rice fields. The part-time fishermen only use a little of their spare time to rest or look for other side jobs, such as farm laborers and industrial workers.

The ESPP Suralaya in industrial area in the Suralaya village of Cilegon City, has been developing from year to year since its establishment. Based on the informant from Suralaya, the ESPP Suralaya was built in three stages of operation, beginning in early 1984 and 1989, and the PLTU project was developed again in 1997. The fourth phase began in 2011.

As a long-established fishing community in the Suralaya region, it has never disappeared from its journey to the present. The development will not change their determination to survive in the Suralaya power plant's coastal area. As traditional fishermen, due to distance fishing, they have experienced limitations in terms of technological aspects and use of fishing gear. Since development has been carried out, fishermen need a far reach for the fishing area; thus, it is necessary to adapt to using technology.

The number of boats is increasing annually (Table 1). Although there were ups and downs in the

Table 1: Estimated number of fishermen and fishing gear technology in 1970-2019

Year	Estimated number of boats	Fishing gear technology
1970	Between 10-25	The boat uses sails
1980	Between 25-30, in the development phase	The boat uses sails
1990	Sekitar antara 15-20 kondisi ini merupakan fase pembangunan Between 15-20, in the development phase	The boat uses sails and already using an outboard engine
2000	Between 50-70	The boat uses an outboard engine
2010	Between 70-100	The boat uses an outboard engine
2019	Between 100-150 boat landing facilities have been prepared by the ESPP Suralaya	The boat uses an outboard engine

Source: The researcher interview in 2019

3.2. Relationship of Social and Economic Environment

The fishing areas around Suralaya are limited to the Sunda Strait area and around the Merak crossing port of Banten Province to the port of Bakauheni, South Lampung Regency, Lampung Province. The power plant and other industrial areas that are growing and developing in the Suralaya beach area, greatly disturb the ecosystem where fishing boats rest. The power plant has shifted the locations of boat stopovers and parking. Therefore, the industry not only shifts the capture location, but also increasingly narrows the space for the Suralaya fishing community's landing boats, forcing them to use the land as is.

Since the construction of the ESPP Suralaya, the fishing community had no comfortable place to lean on, the ESPP Suralaya manager gave them a dock in 2019, in the hope that traditional sea fishing would be sustainable. The dock can accommodate

second phase of the construction of the power plant, many fishermen moved their boats to find safer places to lean on and make landings. Since 2019, the Suralaya power plant has coordinated with the fishermen and continued promoting good relations. That relationship is more about finding various alternative solutions in restoring fishermen's rights to use the coastal area as a place to anchor or land their boats (Nur & Suranto 2017).

around 100 fishingboats; the total area has a width of 57 meters and a length of 215 meters. In the early 2010s, there was an industrial and housing development sector along the Suralaya coast, even though the area was in the hills, and it remained in the border area with the coast.

The traditional fishing community had settled in Suralaya village around the 1950s. While it is still active, the fisherman population has generally declined. According to fishermen informants, the Suralaya village was supported by nature and previous generations' practices. Informant AM (57 years) said that he started as a fisherman because father did, and, at first, he often helped his parents capture marine life. Today, fishermen have become a source of income for their families and, even though they are in the ESPP development area, they still obtain a catch every day.

Since parents arrived in their generation, they made catch in the Suralaya region. Until the

construction of the power plant area and until 2017 they were still in the Suralaya region, although it was not as comfortable as during the 1980s. As Informant Dedi (50 years) stated:

The fishing community, in the past, existed based on natural conditions and only relied on paddles, but in the era of the late 1980s to the 1990s already used an outboard boat engine with a capacity of 10pk. In the days when we were still using sails as a boat booster, it took hours and was very dependent on the weather, when the wind blows. Since using the boat as a boat booster, we no longer know the hours and times of departure. Traditional fishermen only catch around fishing areas in the Sunda Strait sea area and steer the boat in the direction of the wind. The limitations of traditional fishing aids in the past have limited the space for fishing.

Interview (May 5, 2019)

The interview revealed that, in the 1980s, the traditional fishermen who used sails as a tool slowly began using machines. Fishermen had were not only using a trawl, but also using fishing line. The fishing area has also widened, and going to sea can also be done in conditions and situations at any time as long as it does not endanger the fishermen. The weather is no longer a barrier for the fishing community. If, for example, the weather is less friendly, then fishermen only catch about 1 to 1.5 miles from the coast. According to fisherman informant AS (46 years) with the use of outboard engines having a capacity of between 15 pk and up to 24 pk, fishing locations can be set according to the needs and desires of fishermen in the fishing area.

Traditional fishermen's ability to use traditional boats that are only between 3-4 meters long and 1.5 meters wide, requires special expertise, courage, and experience (Khakzad 2016;

Nur & Suranto 2017). Tall, traditional boats have only two passengers and hold three people at the most. Generally, based on observation, each boat is only operated by two people, who have no social status because they help each other. The fact is they still adhere to the captain and there is a companion child. The captain is responsible for directing the boat and determining the location of the catch.

The division of labor still exists, but is not binding; rather, they work together to regulate the direction of fishing gear and remove water from the hull of the boat because of the wind blowing and the impact of water entering the boat's hull. Installing the net (fishing gear) and fishing line contribute to operational success. Traditional fishing communities in Suralaya use fishing rods as well as trawlers. The use of fishing gear is functioned based on seasonal conditions and the type of fish to be caught.

The construction of the ESPP Suralaya affected the environment. The fishermen have assumed that industry does not create obstacles to their maintaining their lives as fishermen. The industry does not affect their activities significantly, and they feel that the presence of ESPP Suralaya is a plan development which is regulated by the government. So far, fishermen have continued carrying out their activities, even around the power plants. The ESPP is a gift because it can help supply electricity to many people in Indonesia, and the fisherman can continue making their catches (Table 2).

The traditional fishing community in Suralaya continues to carry out its activities twice a day. The boats go to sea at 4:00 a.m. and return around 10 a.m. or 12 p.m. daily. Some informants say that results of fishing depend on good fortune and the help of the authorities. They may return early if they feel lonely, but if they feel they will get their catch as expected, then they usually remain at sea.

Table 2. Social ties to increase the institutional capacity of the ESPP Suralaya with the fishing community

Social and Institutional Bonds			
Institutional	Environment	Economic relation	Capacity building
Traditional fishermen	<ul style="list-style-type: none"> Comply with the operational red zone regulations that have been set Fishermen continue to carry out their activities as usual leaving 2 times a day despite the construction 	<ul style="list-style-type: none"> Take part in protecting the ESPP area in order to remain safe from the aspect of the asset area, especially the right to land for the traditional fishing boat landing Fishermen continue to earn around Rp. 100,000 	<ul style="list-style-type: none"> Utilizing the potential infrastructure assistance provided by the ESPP Suralaya in the form of a boat landing

		to Rp. 200,000 every day when the weathers are good	
ESPP Officer	<ul style="list-style-type: none"> • Maintain a balance so that fishermen survive and the industry continues to operate well • Efforts to avoid the impact of sewage disrupt traffic in fishing areas • Waste before being drained in the area around the industrial area has passed through screening according to environmental standards 	<ul style="list-style-type: none"> • Help arrange and issue boat certificates 	<ul style="list-style-type: none"> • Provide training to fishermen on how to catch in collaboration with related agencies • Participate in providing educational and religious facilities to the communities surrounding the area's development.

Source: The researcher interview in 2019

Each time at sea, the fishing community can earn an income of between Rp. 100,000,000 to 200,000.00 with one catch. Marketing of the catch is usually done in the boat landing area. The transaction process is done traditionally, with bargaining between the buyer and the boat owner. Determination of the price is fully carried out through deliberations between fishermen and buyers. The catch, in the form of fish or crab, is usually available for household consumption. Buyers and fishermen actually know each other since they all live in Suralaya village, so the prices are not consistent with the market.

If the fish catch is not sold out, then there are customers who deliberately come to the coastal fishing boat landing area in Suralaya. Outside customers have always been welcomed warmly by the fishing community, because there has been a longstanding relationship. According to informants, the catch was actually sold to regular customers, if

there were no more offers by the surrounding community. The price of fish on board the fishing community is much cheaper when compared to the market, so that people who want to buy fish directly from the fishermen need to know the boat landing schedule.

3.3. Adjustment to the New Culture

Environmental changes after construction of the ESPP Suralaya also caused cultural changes in the communities around Suralaya, especially in traditional fishing communities. These changes are more in terms of economic aspects and fishing area patterns (Symes 2007). Economically, the fishing community has experienced lower incomes because it has to go farther away to catch and operational costs have increased, while the catching pattern changed from low engine capacity to high engine capacity.

Table 3. Social situations and conditions of shifting fishing communities before and after the construction of the Suralaya power plant

Situation and condition	Before development	After development
Funding source	Own operational costs	Joint operational costs with the group
Engine capacity of the boat	10-15 pk	15-24 pk
Catching tools	Fishing line Net	Net trawl
Catching coverage area	Only on the edge of the beach area	The distance of 1-2 sea miles
Operating cost	It uses more human power than an	Increasing because it uses the

	engine fueled by oil fuel	engine and increase the budget to buy fuel oil
Number of personnel	Usually one person (single)	Already uses additional personnel for engine operations

Sources: Researcher Interviewin 2017

Development can not be postponed because the ESPP decision and development policy is under the central government's authority. As a policy originating from the central government, local communities are expected to remain compliant with the development, even though there will be changes in different conditions. The community should be able to adjust to environmental changes in line with the needs of technological development (Table 3). The ESPP's construction is part of the government's commitment, as a union supplier, to meeting the electricity needs of Java and Bali with a capacity of 3,400 Mega Watt (MW). As a large generator, it is one of the backbones of electricity in the Java region.

Changes occurring in terms of development require traditional fishing communities to find their own solutions in order to maintain their lives. It is through these changing conditions that the mindset and knowledge of Suralaya fishing community are encouraged to be more creative in opening up jobs so that they can survive in the Suralaya region and beyond. Since the ESPP Suralaya was built, there have been a number of people moving because the land has had a direct impact on development, and they felt uncomfortable living side by side with industry. Likewise, from the aspect of work, there are people who move to work in the industrial sector and fisher on the side.

Suralaya as a hereditary settlement, of course, is expected to not only have an economic impact on the community and the narrowing of operational land as fishermen. Local communities should become a priority due to development. This was confirmed by Informant BID (40 years), who stated that

The existence of the construction of the ESPP has forced the surrounding community and fishermen to think of making an adjustment in accordance with applicable values and norms to utilize the natural environment as needed. Restrictions on fishermen's activities are also limited by the ESPP rules. Areas that are considered not catchable and people are also prohibited from engaging in the area of the ESPP Suralaya monitoring radius.

(Interview June 5, 2017)

The existence of ESPP in Suralaya does not make the fishing community stop their activities as

fishermen, because the maritime culture inherited from their ancestors has become part of their main work. Development is part of a process that continues to go hand in hand with needs, so that the fishing community in Suralaya continues to think and realize that its life is part of the ecosystem and not separated from the ecosystem that gave it life so far. As traditional fishermen, whose power is very close to the coast and the location of the Suralaya industry, they must be smart and be able to position their catchment area so that they can still get results.

As humans who have a culture of capturing marine biota, of course, they realize that they have a moral responsibility aligned with their capabilities and need to avoid exploitation. Based on observations of traditional fishing communities who are active in the area of power plant construction, so far, only rely on simple and environmentally friendly technology. Although there has been a change in the environment around the Suralaya area, it has not changed traditional fishing activities.

The ESPP Suralaya produces liquid and solid waste as well as smoke. Operationally, it does not disturb the community because of a designated red zone boundary, where activities of any kind, including fishing, are prohibited. Based on that condition, the community must make adjustments at the fish catching location. Informant BAK (32 years) said that

During this time fishermen make adjustments, so does the ESPP still paying attention to the disposal of its waste. So far, fishermen have never felt significantly disturbed due to the waste in the Suralaya power plant industry, because the management is filtered before being discharged into the sea. The existence of ESPP waste so far has been carried out according to environmental quality management standards in accordance with the rules.

(Interview March 10, 2019)

ESPP waste management carries out filtering properly, so that even marine life, such as fish, can live and thrive in the ESPP Suralaya waste water treatment and filtering environment. This was done as part of a commitment to maintain the ecosystem that lives around it and still provide opportunities for fishing communities to live and

engage in their activities. As ESPP Suralaya implementers, the waste is filtered about 3–4 times and then disposed of in the sea, but in the waste water storage area it is kept safe. Fish living in waste collection areas cannot be consumed. Strict care is taken so that speculation does not occur and does not directly affect human health. To prove that the Suralaya power plant waste does not threaten the marine biota ecosystems in the surrounding areas, in the storage ponds in which the waste has been processed, fish has been deliberately maintained in order to be able to measure the level of waste water is having good quality.

The actual waste management has been standardized, but the complaints of traditional fishermen who live around ESPP Suralaya are that the port arrangement is very disturbing. The port, which is about 200 meters from the boat landing of the fishing community, results in fishermen being unable to catch fish around an area considered to have good fishing potential. Unloading activities carried out by coal-carrying vessels are often carried out for days, causing disturbances among the fishermen who are nearby. Anticipating this, the fishing community must force themselves to catch near the Merak crossing port, which takes about 1–2 hours to reach.

Since the construction of port facilities as a carrying capacity of the ESPP Suralaya in the 1990s era, the Suralaya community, especially the fishing community, has been able to adapt. Since the construction of the ESPP Suralaya in the 1980s, the fishing community has felt the existence of changes in the environment and the surrounding climate, and has realized that the presence of industry will create a new habit or culture in the Suralaya community. The new culture occurs in terms of behavior to keep protecting the surrounding environment, especially people who are active around the Suralaya coastal area. The change occurred accustomed to keeping the sea maintained as before, thus the Suralaya beach can still be used as a tourist area for local people.

4. CONCLUSIONS

The existence of the ESPP area in general causes climate change in the coastal areas, especially near the plant. In 2019, the ESPP Suralaya prepared a boat landing site for fishermen as part of its corporate social responsibility. The construction of ESPP Suralaya was carried out in four stages, in 1984, 1989, 1997, and 2011. Institutionally, the social field of the ESPP Suralaya provided educational and religious assistance to the communities surrounding the ESPP development. In addition, fishermen also collaborate with ESPP to protect fishing areas,

avoiding the designated red zone area established by the ESPP Suralaya. The fishing area for fishermen is still ongoing, and fishermen can adjust to restrictions on space and territory determined by the ESPP Suralaya.

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