Challenges to the sustainability of small-scale fishers livelihood in Banyuwangi regency, East Java, Indonesia

Rilus A. Kinseng1*, Amir Mahmud2, Andan Hamdani3, Hilda Nurul Hidayati3

1Associate Professor at the Department of Communication and Community Development, Faculty of Human Ecology, and Head of Knowledge Production Division, Center for Transdisciplinary and Sustainability Sciences
2Director of Sa'jogyo Institute
3Freelance researchers
*coresponding author: rilus@apps.ipb.ac.id

Abstract. Small-scale fishers in Indonesia face various challenges that threaten sustainability of their livelihood. However, since Indonesia consists of diverse socio-cultural and natural resources conditions, the precise characteristics and nature of the challenges may vary from one location to another. Therefore, it is important to study these challenges in certain places in Indonesia. This study was conducted in two villages in Banyuwangi Regency, East Java Province, March-April 2018. Using a qualitative approach, this study shows that small-scale fishers of the research locations face a variety of challenges to their livelihoods. These challenges are two both from nature as well as from socio-economics conditions. As from nature, climate change and environmental degradation are the most felt by the fishers. Meanwhile, as from the socio-economic dimensions, patron-client relations and Government policies, such as the prohibition of catching fries, are most felt problems.

Keywords: climate change, conflict, livelihood, small-scale fishers, sustainability

1. Introduction

Indonesia is known as the largest archipelagic nation, and has a great maritime potential. As a maritime country, sea and fisheries certainly are important resources for people's livelihood in Indonesia. One of the community groups in Indonesia that rely on the sea for a living and to feed their families is fisher. The official statistics of 2016 indicated that 2.643,902 (two million six hundred three thousand and nine hundred two people) engaged in fisheries [1]. Fishers in Indonesia are spread in various districts, including in Banyuwangi Regency, East Java.

More than thirty years ago [2] reported that most of fishers in Indonesia were small-scale. Similarly, Betke also maintain that “The majority of ...marine fishermen in Indonesia, though, may still be categorized as ‘artisanal’ or ‘small-scale’ producers, often also referred to as ‘traditional’...” [3]. Apparently, up to now most (96.30%) of fishers in Indonesia are also classified as "small-scale fishers" [1]. Actually, the small-scale fishers is not only dominant in Indonesia, but in the world as a whole. For example, FAO estimated around 95 percent of the world’s fishers are small-scale [4].
In line with its number, small-scale fishers play an important role in providing fish as food. As stated by [5], "Small-scale fisheries contribute about half of global fish catches". Moreover, they also play an important role in providing employment. As FAO stated, "Small-scale fisheries employ more than 90 percent of the world's capture fishers and fish workers ..." [5]. In addition, small-scale fisheries also play an important role in increasing the availability of nutritious food for local human consumption, as well as in driving the local economy in coastal areas, and to alleviate poverty [4].

Although small-scale fisheries and small-scale fishers have a very important role, however small-scale fishers face various challenges for their livelihood's sustainability. Like in other countries of the Southeast Asian region, the fisheries sector in Indonesia is also facing both natural and social problems such as illegal fishing, fish stocks availability, unregulated and unreported (IUU) fishing. Some small-scale fishers fishing grounds, especially in the Java Sea, have also reach over-exploitation. Actually, the problem of over-exploitation is also faced by other fishers in Southeast Asia [6]. As reported in the introduction of [7], Brian Davy stated that “increased fishery overexploitation and degradation habitat are threatening the Earth's coastal and marine resources” And of course this is a very serious problem for the small-scale fisher livelihood sustainability. Concretely, these various sources of challenges and threats to the livelihoods of small fishers of Indonesia include reclamation, mining activities, expansion of oil palm plantations, establishment of conservation areas, increasingly uncertain weather, monopoly on trade in catches, government policies that regulate fishing activities, and so on. This is in line with [8] who stated that small-scale fisheries globally face stresses caused by claimate change, pollution, resource degradation, etc. It is important to note that, uncertain wheather is not only faced by small-scale fishers but also by another coastal communities, such as small-scale salt producers [16]. Lately, the challenges faced by small fishers have become increasingly difficult due to climate change, which has resulted in increasingly uncertain weather. Socially, as said by [5], "many small-scale fishing communities continue to be marginalized ...".

The characteristics of small fishers and the challenges they face may varies between regions in Indonesia. As stated by [5], "Small-scale fisheries represent a diverse and dynamic subsector ...

2. Methods

This study was conducted in two villages in Pesangaran Subdistrict, Banyuwangi Regency, East Java, namely: Sarongan village (Dusun Rajegwesi) and Sumberagung village (Dusun Pancer, including Pulau Merah), from March to April 2018. Two villages were chosen as the study sites, because fishers in those two villages are small fishermen. Data collected were both primary and secondary data. Primary data were collected based on the structured interviews using questionnaires (surveys) as well as the in-depth interviews (in-depth interviews) to several fishermen using guided interview. Eighty (80) fishers were chosen randomly as respondents, thirty five (35) from Sarongan village and forty five (45) from Sumberagung village. Secondary data were taken from various relevant documents, such as Kecamatan Dalam Angka from Central Agency on Statistics.
3. Result and discussion

3.1. General Description of the Study Site

3.1.1. Villages Location

Sarongan and Sumberagung villages are located in Pesanggaran District, Banyuwangi Regency, East Java Province. Pasanggaran District is one of 24 sub-districts in Banyuwangi Regency. Among the five villages in Pesanggaran sub-district, the two villages, namely: Sarongan and Sumberagung are coastal villages in the areas. Geographically, the coastal area of the two villages are lined up from east to west in Pesanggaran Subdistrict. In the south, Sarongan village is directly adjacent to the Indonesian Ocean. This village is actually located within the Meru Betiri National Park area. Meanwhile, Sumberagung village is also directly on the coast of the Indonesian Ocean in the south. Part of the Sumberagung village area is situated in the production forest of Perum Perhutani (State Forest Enterprise). The area includes, Pulau Merah and Wedi Ireng Beaches.

3.1.2. The Communities

In 2015, according to latest census the population of Sarongan village was 3,599 people, while the Sumberagung village was 8,960 [11]. The livelihood portfolios of households and individuals of the villages are typically diverse – spanning fisheries, agriculture, casual or informal labor, and to a lesser extent, formal employment.

Livelihoods of the two villages studied are mostly in the agricultural sector (rice and secondary crops), plantation, industry, trade, social services and fisheries. Referring to the 2015 data, in terms of number, fishers are the middle-ranking position in these communities. In Sarongan village the number of workers in the fisheries sector were 193 persons, whereas in Sumberagung village was as many as 712 persons.

3.2. Socio-economi characteristics of small-scale fisheries in Banyuwangi

3.2.1. Characteristics of respondents

Respondents for the study were the fishing vessel owners and fishing vessel crew (ABK). Fisher owners are owners of fishing boats to catch fish in the sea, while ABK are crew who use nets, fishing rods, traps, or other equipment to catch and gather fish or other aquatic animals from the sea, or oceans, for human consumption. The vessel crew can also be said as fisher laborers.

Only fishing vessel owners who officially reside on those two research locations were chosen as the respondents as it was just to limitize the scope of respondents' data collection. As many fishers from other different locations rather than those two research locations (Pulau Merah-Pancer and Rajagwesi) have also been anchoring their boats there. The characteristics of respondents based on their status (fishing vessel owners / crew members), are presented in Figure 1.

![Figure 1. Percentage of respondents by fishing vessel ownership / crew members of the two research areas](image-url)
In general, the respondents of the present study were fishing vessel owners of both Pulau Merah-Pancer Beach and Rajagwesi. Most of the fisher households in the two research locations owned fishing vessels. As presented in Figure 1, the proportion between fishing vessel owners and laborers in Rajagwesi are 71.14% as owners and 28.86% as laborers, while the proportion between fishing vessel owners and laborers on Pulau Merah Beach-Pancer are 66.67% as owners and 33.33% as laborers. Thus, the majority of fisher households in those two research locations have their own vessels for fishing. For access and control of fishing gear, such situation shows that small-scale fishers of those two research locations are in good condition.

![Figure 2. Percentage of respondents based on their education level of the Two Research Areas](image)

**Figure 2.** Percentage of respondents based on their education level of the Two Research Areas

Education is one of the things that are important to human life. The vast majority of respondents in Pulau Merah-Pancer and Rajagwesi were graduated from elementary schools (*Sekolah Dasar*) and some even did not attend from elementary school. 51.11% of respondents in Pulau Merah-Pancer and 37.14% of respondents in Rajagwesi did not complete elementary school. Data on the educational status of fishers in the two villages are presented in Figure 2. The data show that fishers generally have low education. This is related to the limited availability of educational facilities in each village. The low level of education of fishers is common because the understanding of the population that having high and low schools will still go to the sea and become fishers just like their parents.

### 3.2.2. Fishing gears

The basic fishing equipment used by small-scale fishers in these two villages is multi-gears, meaning more than one type of fishing gear. A basic understanding of the properties, function and operation of the major fishing gears and methods is therefore fundamental for decision-making in fisheries management, particularly when it comes to technical measures in fisheries regulations. The use of fishing gear is adjusted to the seasonal fishing. Several types of fishing gear used by coastal fisheries in this areas include longline, gillnets, lobster nets and spearguns, etc. This is a way for small-scale fishers to overcome fish resources problem so that they can continue fishing. The types of fishing gear according to villages in the study area are presented in Table 1.
Table 1. Types of Fishing Equipment Used by Small-scale Coastal Fisheries in the Two Research Areas

| No | Types of Fishing Equipment       | Pulau Merah and Pancer | Rajegwesi |
|----|----------------------------------|------------------------|-----------|
| 1  | Tonda fishing rod                | ✓                      | ✓         |
| 2  | Squid fishing                    | ✓                      | ✓         |
| 3  | Octopus fishing rods             | ✓                      | ✓         |
| 4  | Fishing hook                     | ✓                      | ✓         |
| 5  | Gillnet                          | ✓                      | ✓         |
| 6  | Lobster nets                     | ✓                      | ✓         |
| 7  | Speargun                         |                        | ✓         |

Source: processed primary data, 2018

3.2.3. Boat used for fishing in the study area

Generally, fishing boats used in the two research locations are categorized as small size (equal and less than 2 gross tons/GT). The percentage of the fishing boats that equal and less than 2 GT in Sumberagung Village was 77.78% and in Sarongan Village (Dusun Rajegwesi) was 97.14%. Data on the size of fishing boats used by fishermen in the two study areas are presented in Table 2.

Table 2. Total Number of Fishing Fleet / Vessel based on Tonnage Size by Village in the Two Research Areas

| No | Tones (GT) | Sumberagung village | Sarongan village |
|----|------------|---------------------|------------------|
|    | Number     | Percentage (%)      | Number           | Percentage (%)  |
| 1  | ≤ 2         | 35                  | 77.78            | 34              | 97.14            |
| 2  | 3-4         | 5                   | 11.11            | 0               | 0                |
| 3  | 5-10        | 5                   | 11.11            | 1               | 2.86             |
|    | Total       | 45                  | 100              | 35              | 100              |

Source: processed of primary data, 2018

In line with the size of the boat, the boat engine used by fishermen in the two research locations is generally outboard motors with 15-18 horse power (HP). Data on the total number and percentage of fishing boat according to its engines in the study locations are presented in Table 3.

Table 3. Number of Respondents Utilizing Fishing Vessel with its Strength in the Two Research Areas

| No | Fishing Vessels Machine | Sumberagung village | Sarongan village |
|----|-------------------------|---------------------|------------------|
|    | Number                  | Percentage (%)      | Number           | Percentage (%)  |
| 1  | 5 HP                    | 1                   | 2.22             | 1               | 2.86             |
| 2  | 8 – 9 HP                | 12                  | 26.67            | 19              | 54.29            |
| 3  | 15 – 18 HP              | 32                  | 71.11            | 15              | 42.86            |
|    | Total                   | 45                  | 100.00           | 35              | 100.00           |

Source: processed of primary data, 2018

3.2.4. Fishing Seasons

On West Season which runs from November to the end of February or the beginning of March, where strong wind and wave height seasons occur, many fishermen do not go fishing. Many fishing activities began in April. The peak fishing season in Sumberagung village (Pancer-Pulau Merah Hamlet) occur in September and October. While in Sarongan village (Rajegwesi Hamlet) peak fishing season occur in July and August. This is due to differences in natural conditions and characteristics of fishing grounds.
3.2.5. Fishing grounds
Fishing grounds are generally not far from the coastal, in the waters no more than 1-3 miles off the coast. When the sea is calm, fishing may occur around 10-15 miles from the coast. The time needs to reach the fishing grounds ranges from 15 minutes to 2 hours. Especially in Pancer Hamlet several fishing vessels were equipped appropriately for fishing activities up to 20-40 miles from the coast, with 5 hours travel time. Such fishing trips typically last between 5-7 days per fishing trip.

3.2.6. Fishing operations
Fishing operations by fishers in the study area are generally carried out within one day only or known as one day fishing. Fishing activities can be carried out during the day or night. If they go out to sea in the morning, then they return home in the afternoon, or if they go out to sea in the afternoon, then they go home in the morning. The fishing gears used to catch fishes in the morning/afternoon were spearguns and gill nets, while fishing gears used for fishing operations at night are net with lobster catch targets. Lobsters are also caught by using fish device, namely lamp.

3.2.7. Marketing system
The pattern of distribution of catches on Pulau Merah-Pancer and Rajegwesi is not much different, namely from fishers to bosses in the village and then sent to juragan (bosses) in Muncar, Banguwangi. When the fishers bring fish to the beach, those on board sort out the entire catch species wise and place them either for auction or for sale to the merchants. In these two locations there are 2 to 3 bosses in each location, who buy and collect catches from fishers and then carry and sell them at Muncar.

In addition to the previous pattern, two other marketing distribution patterns are also applicable, namely: 1). The marketing of catches from fishers directly to retailers in the village for village consumers; 2). The other pattern, catches were brought by truck by fishers directly to fish landing site (TPI) in Pancer to juragan or bosses in Muncar. This second pattern is carried out by fishers who posses relatively "big" fishing vessel with more than 2 GT. The distribution pattern fish catches is presented in Figure 4.

![Figure 3. Distribution of Catch Fish to Consumers by Fishermen](image)

Many fishers in this research location have no other choice to sell their catches other than to the bosses. The debts that fishers owe to bosses is the factor of occurrence of binding relationships between fishers and bosses, therefore they have to sell their catch to the boss. Debts to bosses arise because of uncertainty about the catches obtained by fishers, as well as insufficient capital for fishing. By binding through the debt, the bosses get two benefits at once, namely: the profit from the purchase price of the fisher's catch determined by the bosses, and the profit as middlemen to sell the catch to the bosses at Muncar.
There is a Fish Auction Site (TPI) in Pancer but it does not function optimally. When the fish is landed in TPI Pancer, the fish is not sold through the fish auction system. Marketing of catches of small-scale fishers in Pancer is usually carried out in two ways: 1). Carried by land transportation (truck) to Muncar; and 2). Brought or bought by local traders to be sold at the market in Pesanggaran District. Not only local fishers of Pancer sell their fish in Pancer but also migrant fishers (known as andon) from Muncar or other areas. Not only catches for consumption were sold and brought to Muncar by bosses but also fish fries. Indeed, shrimp fries are banned, but bosses in two locations are still willing to accept the shrimp fries and collect it for further transport to Muncar. In fact there have been cases, local shrimp fries collectors were arrested and detained by police officers.

3.2.8. Organization in fishing

Fishing organizations in two research areas are simple as they are based on the role played by fishers when fishing. There are two type boat owners, owner who goes to sea and owner who does not go to sea. The role of the crew when fishing is not too tight, such as the role of captain, engineer or cook. Of course the number of crew members depends on the gross tonnage of the boat (GT) and the distance of the locations for fishing. For fishers who go alone for fishing, all roles are carried out by themselves. The number of fishers in one boat is around 1 to 4 people, or an average of 2 fishers. While in the andon boat (migrant fisher) in Pancer, the number of fishers in one boat varies 15 to 20 people. For the socio-economic relationship in the capture fisheries production, boat owners not only have relations with crew members for fishing boats but also with collectors (juragan or pangambek).

3.3. Challenges to the fishers’ livelihood

3.3.1. Sumberagung Village (Merah Island and Pancer)

Small-scale fishers of the two research locations face a variety of challenges to their livelihoods. They are generally faced with the same constraints, both natural condition and socio-economic problems. These challenges and obstacles affect their earning a living. As the source of their livelihood is in the sea with uncertain results, therefore fishers are at risk of uncertainties. The damage done by overfishing goes beyond the marine environment is classified as the natural factor. In Sumberagung Village, Pulau Merah Beach and Pancer, the majority of respondents (82.22%) stated that weather has been an increasingly difficult to predict. In this case, one respondent had been allowed to provide more than one respond, thus the diversity of responds show that the fishermen encountered various problems. Details of the problems faced by fisherman are presented in Table 4.

| Fishing Problems                                      | Number of People | Percentage (%) |
|-------------------------------------------------------|------------------|----------------|
| Weather is more unpredictable                         | 37               | 82.22          |
| Decreased catches                                     | 27               | 60.00          |
| Fluctuations in fish catches                          | 7                | 15.56          |
| Environmental degradation of the catching areas       | 10               | 22.22          |
| The fishing ground area is getting farther away       | 9                | 20.00          |
| Expensive fuel prices                                 | 11               | 24.44          |
| Limitation of fishing gear                            | 1                | 2.22           |

Source: processed of primary data, 2018

The second problem that is often faced is the declining catch. Most respondents explained that this second problem could be the impact of environmental pollution due to the existence of gold mining company. Degradation of the environment through natural and anthropogenic interventions has been identified as the primary causes for the decline in open water capture fishery production. This will naturally raises the problem of uncertainty in the livelihoods of small-scale fishers, as they have to go increasingly further away from their home waters. Pulau Merah and Pancer are relatively close to
the mining area so pollution from gold mining may have greater negative impact on livelihood of the communities.

Experiences of fishers on Pulau Merah and Pancer undergone through the problems when they go fishing, enabling them to set strategy to secure a sustainable income. To cope with fish catch fluctuation they have to do other jobs to maintain their livelihoods. In Pancer and Merah Island, respondents who fished as a main occupation were 48.89%, then followed by those who have two types of jobs namely fishers and farmers 28.89%. Table 5 shows that livelihood of the households do not only come from their job as fishers but also from other income generating activities. Most farmers in Pulau Merah and Pancer are agricultural farmers and in the dragon fruit farming.

Table 5. Respondents on Pancer and Pulau Island with Their Type of Work

| No | Type of Works                                      | Number of People | Percentage (%) |
|----|---------------------------------------------------|------------------|----------------|
| 1  | Fishers                                           | 22               | 48.89          |
| 2  | Fisher laborers                                   | 1                | 2.22           |
| 3  | Fisher and farming                               | 13               | 28.89          |
| 4  | Fisher and cattle herding                         | 1                | 2.22           |
| 5  | Fisher and farm laborers                          | 1                | 2.22           |
| 6  | Fisher and jobs in the tourism sector             | 5                | 11.11          |
| 7  | Fisher and odd jobs                              | 1                | 2.22           |
| 8  | Fisher and farming in the fishing villages        | 1                | 2.22           |
|    | Total                                             | 45               | 100            |

Source: processed of primary data, 2018

In addition to work as farmer, fishers on Pulau Merah and Pancer have side jobs in the tourism sector, as coast guards, surf coaches, and offers boats for rental for tourists. During the holiday season, fishers on Pulau Merah were involved in the tourism sector as tourism promise greater income than fishing. Benefits from tourism can in many cases be far greater than the opportunity cost of foregone fishing. In the future, tourism may be the best livelihood choice for the small-scale fishers here, as also happen in fishing community in Pari Island [12]. Slightly different situation occurs in Pancer, in this area fishers prioritize going to sea rather than tourism. This is because beach tourism in Pancer is not as busy as tourism on Pulau Merah Beach. The environmental factor can concurrently affect the coastal areas of Merah Island, it is the reasons why most Pancer fishermen are very dependent on one single job as a fishers. Thus, Pancer Beach is noted as fishing village. Almost every household in Pancer is engaged in fishing and fish farming. Fishers from outside Sumberagung, as well as other places such as Muncar and other surrounding areas dock their fishing boats at Pancer.

In times of famine or when they experience difficulties to go for fishing, as many as 60% of respondents on Pulau Merah and Pancer they tried to find other jobs (see Table 6). Secondary occupations practiced by fishermen, among other they were involved in serving tourist as tukang ojek wisata by renting a boat for tours, as farm laborer, to become a surf instructor, and looking for firewood in the forest. Other efforts practiced by as many as 35.56% of fishers during famine were borrowing money from warung (small local shop). Before going to sea, the fishers usually owe to the warung for fuel and their debts were paid after they got fish from the sea.
Table 6. Household Strategies in Responds to famine in Pulau Merah – Pancer

| Activities to overcome famine                        | Number of People | Percentage (%) |
|------------------------------------------------------|------------------|----------------|
| Find another job                                      | 27               | 60.00          |
| Fish catching in other areas                         | 8                | 17.78          |
| Fishers owe money to *warung*                         | 16               | 35.56          |
| Fishers owe money to relatives or friends             | 7                | 15.56          |
| Fishers owe money to *juragan/* bosses                | 14               | 31.11          |
| Selling properties                                   | 1                | 2.22           |
| Take credit or loan from illegal creditors (*rentenir*) | 0               | 0.00           |
| Borrowing money from the bank                        | 3                | 6.67           |
| Require their wives to work                           | 1                | 2.22           |
| Require their children to work                        | 0                | 0.00           |
| Reducing households expenses                         | 1                | 2.22           |
| Withdrawal money from deposit                        | 1                | 2.22           |
| Homestay business                                    | 1                | 2.22           |
| Do nothing                                           | 3                | 6.67           |

Source: processed of primary data, 2018

In addition, some of the respondents decided to keep going to sea and catch fish in other areas such as Grajak, Rajagwesi, to Jember. To make their ends meet, most of the fishers borrowed money from ‘*warung*’. They secured credits from relatives or friends or to bosses. The higher level of debt among fishers has indicated the condition of their structural poverty, moreover they are bound to sell their fish to bosses. They don’t mind that they owe to the bosses as they’ll pay the debt by deducting the price of the fish they sell to the bosses.

3.3.2. Sarongan village (Rajagwesi)

Similar to experiences faced by fishermen in Sumberagung Village, most fishers in Sarongan Village (Rajagwesi) stated that weather has been an increasingly difficult problem, it was really unpredictable. As many as 48.57% of the 35 respondents responded that the hardest problem they encountered going to sea for fishing was the unpredictable weather. The weather patterns have become far more unpredictable and they affect the declining catches (see Table 7). In addition to weather problems and declining catches, 34.29% of respondents responded that other problems they encountered when fishing were increasingly distant capture areas. Although the mining area is quite far from Rajagwesi, fishers in Rajagwesi realize that year by year the pollution caused by gold mine will impact on their catchment area.

Table 7. Problems encountered when fishing at Rajagwesi

| Problems Encountered                        | Number of People | Percentage (%) |
|---------------------------------------------|------------------|----------------|
| Unpredictable weather                       | 17               | 48.57          |
| Declining in fish catches                   | 17               | 48.57          |
| The fluctuating of fish catches             | 1                | 2.86           |
| Degradation of the fishing ground           | 1                | 2.86           |
| Increasingly distant fishing ground         | 12               | 34.29          |
| Expensive fuel prices                       | 0                | 0.00           |
| Wind and waves                              | 10               | 2857           |
| Competition with big ships                  | 2                | 5.71           |
| The ship’s engine is not working            | 4                | 11.43          |

Source: processed of primary data, 2018
The other constraints are strong wind and high waves. At a time when the large waves appear, the fishers decided not to go to sea and prefer to work on land. The other constraints they encountered were technical problem, the engine of their fishing vessels is not working (11.43%) and competition problems with larger fishing vessels (5.71%). The record showed once there was a larger fishing ship searched for fish in their fishing ground, she had caused the large waves in the sea. The waves disturbed the targeted fish they catch, cause the declining in the fishers catch. The large ship managed to capture various types of fish that small fishers should be able to get.

To overcome the problems faced when fishing, fishers in Rajagwesi have a variety of livelihoods. Ecologically Rajagwesi is located in the Meru Betiri National Park area. Historically ancestors of the local community of this village had not only as sailors, but also as cultivators. The national park contains several resources that can be utilized by the local people. Many people take forest products in fulfilling their daily needs by selling forest products, even some people make them as basic jobs such as raising livestock, and grazing for livestock. Compared to the other two locations, Rajagwesi has more sources of income. The population in Rajagwesi is also classified as active and productive because it does not only rely on uncertain marine products.

Table 8. Total Number and Type of Work of Respondents in Rajagwesi

| No | Type of Work | Number of People | Percentage (%) |
|----|--------------|-----------------|----------------|
| 1  | Fisher       | 9               | 25.71          |
| 2  | Fisher and grazing | 9 | 25.71 |
| 3  | Fisher and farming in the fishing villages | 6 | 17.14 |
| 4  | Fisher and livestock farming | 2 | 5.71 |
| 5  | Fisher and cattle herding | 1 | 2.86 |
| 6  | Fisher and jobs in the tourism sector | 6 | 17.14 |
| 7  | Fisher and construction laborers | 1 | 2.86 |
| 8  | Fisher, grazing, and cattle herding | 1 | 2.86 |
| Total | 35 | 100 |

Table 9 explained that 25.71% of the 35 respondents were involved in fishing as his single job. This data is in accordance with total number of respondents who were involved in fishing as their main job and grazing as their second job (25.71%). The fishers usually start to go fishing at 15.00 and go home in the morning at around 05.00 to 06.00 WIB (Western Indonesian Time). In the day time, at around 10:00 up to evening before returning to sea, they do their second job as grazing. But the side job is not carried out every day, thus most of their time would be utilized for fishing.

In addition to have optional job as grazing, fishers in Rajagwesi have a side job as farmer and working in the tourism sector. Ecologically the area of the national park is relatively large, therefore local communities prefer to be fishers as a main occupation main jobs as farmers rather than fishing. For tourism, this national park area is very potential so that visitors who come not only come from domestic but also from abroad. Some residents even prefer to be tour guides and homestay businesses for Teluk Ijo and Sukamade tour packages. Another job usually practiced by fishermen is to take care of other people's cows until they are grown.

In the famine period, most of the fisher households in Rajagwesi or 68.57% of them borrowed money to warung (see Table 9). Such situation had also been practiced by fisher households in Sumberagung Village. Before going to sea for fishing, the fisher households in Rajagwesi borrowed money from warung and would payback when they returned home after getting the catch from the sea. If they do not bring the catch, the debt they have is even higher. The second largest percentage is by finding another job, which is 57.14%. The optional jobs carried out included to become an ojeg (motorcycle) taxi driver, farming, grazing, building construction, and raising livestock.
In addition to borrow money to warung, fishers are also borrowing money from their bosses, as they have signed bonding for their work status with their bosses. Debt to the bosses is also not considered to be burdensome because the payment system, the bosses will deduct the payment of fishes they sell. Various efforts are prepared by fishers to overcome famine, including fishing in other areas such as Grajak, Jember and Mustaka. Another activity to overcome famine is to secure credit of borrowing money to relatives and friends, selling properties, taking credit or loan from illegal creditors, borrowing money from the bank, requiring wives to work, reducing household’s expenses, and cattle farming. This activities are practiced similarly by fishers in other part of West Java, as stated by [13].

Social conflict is part of our social life, and therefore it is not surprising if small-scale fishers in the research site are also experience social conflicts. Actually, almost all fishers in Indonesia as well as Southeast Asia in general have also experience social conflicts [6, 14, 15].

As stated earlier, there are several challenges faced by small-scale fishers of Pulau Merah, namely challenges by the Tumpang Pitu gold mining activities in Red Island region. This gold mining is carried out by a national private company, and began its activities since 2015. In the perception of the small-scale fishers, the mining operation has caused of the pollution of their fishing ground. According to them, the operation of the gold mining, caused sea pollution leading the damage environment of Merah Island and Pancer, finally it causes the declining caught fishes in this areas. In addition, the gold mining causes their fishing grounds getting farther from the coastal areas, so they must go farther and farther to fish.

Many small-scale fishers on Pulau Merah had expressed opposition to the establishment of mining operations. They have protested against the operation of gold mining companies. Intensive and long-running conflict between local communities, including small fishers, with the mining company have been carried out. At the beginning of mining activities (in 2015) the local communities even burned the company’s facilities. Similar protests had also been repeatedly carried out by the local community. They demanded the closure of mining activities by the company. For them, mine closure is the only way out of this problem; there is no better solution. In their understanding, mine waste must be dumped into the sea. Actually, fishers conflict due to mining activities is not only happen in this area. For example, fishers in Balikpapan, East Kalimantan, have also experienced the same phenomenon [15].

Other problems that threaten relationships between small-scale fishers and mining companies among other are land access to the Red Island and its surroundings. As stated earlier, small-scale fishers and local communities of Pulau Merah have long lived in the Perum Perhutani production

| Table 9. Household Strategies in Responds to famine in Rajagwesi |
|---------------------------------|------------------|------------------|
| Activities to overcome famine   | Number of People | Percentage (%)   |
| Find another job                | 20               | 57.14            |
| Fish catching in other areas    | 9                | 25.71            |
| Fisher owe money to warung      | 24               | 68.57            |
| Fisher owe money to relatives or friends | 1       | 2.86             |
| Fisher owe money to juragan/boss| 11               | 31.42            |
| Selling properties              | 4                | 11.43            |
| Take credit or loan from illegal creditors (rentenir) | 1 | 2.86 |
| Borrowing money from the bank   | 4                | 11.43            |
| Require their wives to work     | 1                | 2.86             |
| Require their children to work  | 0                | 0.00             |
| Reducing households expenses    | 2                | 5.71             |
| Cattle farming                  | 1                | 2.86             |
| Do nothing                      | 2                | 5.71             |

Source: processed of primary data, 2018
forest area, but the local communities have not been granted certificate of land ownerships. Meanwhile, the gold mining company was easily given license to convert the Perum Perhutani protected forest into a permanent production forest with an area of about 1,942 ha through the Decree of the Minister of Forestry of the Republic of Indonesia Number SK.826 / Menhut-II / 2013. In this permanent production forest, the company obtained a Forest Land Use license to convert forest land for exploration and exploitation of mining production. Though the gold mining company has obtained a permit from the government, this condition creates a feeling of injustice for small-scale fishers and local communities related to the uncertainty of their ownership rights. The issue of land access is certainly very sensitive, because it involves the certainty of their residence and livelihood.

Tensions and conflicts between small-scale fishers and mining companies have even affected the implementation of this research. Many small-scale fishers of Pulau Merah refused to be interviewed, they worried that the data submitted would be utilized by mining companies for the benefit of the company.

4. Conclusions and suggestions
Based on the description and conclusion above, our suggestions are:
1. Fishers of those two research locations are classified as small-scale fishers, the majority of them use fishing boat of 2 GT, and operate traditional and simple fishing gear technology, such as nets and fishing rods;
2. Three types of marketing methods of fisheries products: 1). Fishers to juragan/ bosses or collector, who then sell the products or jargan or big boss in Muncar; 2). Fishers to small traders who sell fish directly to consumers in the village; and 3). Direct marketing by fishers to juragan in Muncar by land transportation (truck);
3. Organizations in fishing in two villages are still simple. Some group of fishers go to sea alone. The number of fishers in one boat when fishing ranged from 1 to 4 people, with an average of 2 fishers. In other words, most fishing activities only involve one crew member, in addition to the owner himself;
4. In terms of livelihood strategies, in Pancer and Pulau Merah, 48.89% of the respondents have single job as fisher, then followed by combination of fisher and farmer (28.89%). Meanwhile, 25.71% of respondents in Rajegwesi only work as fisher, equally those who have two jobs (fishing and grazing) are also 25.71%;
5. Small-scale fishers of the two research locations face a variety of challenges to their livelihoods. These challenges are both from nature as well as from socio-economics conditions. As from nature, climate change and environmental degradation are the most felt by the fishers. Meanwhile, as from the socio-economic dimensions, patron-client relations and Government policies, such as the prohibition of catching fries, are most felt problems.

Based on the description and conclusion above, our suggestions are:
1. The government needs to conduct an in-depth evaluation of current fishery regulations and controls to ensure a high but sustainable yield to the fishery. It is necessary to think about the possibility to impose a system "open and close" fry catches. It means that fry can be caught in certain times but not in another times. This system is widely practiced traditionally in many parts of Indonesia, such as the sasi system in Maluku and Papua;
2. The Regional Government and the private sector (including mining companies) should develop the fishing cooperatives for fishers, as cooperatives will help fishers to access sufficient capital for fishing and marketing their products;
3. Community-based tourism can be further developed for livelihoods diversification of fishermen and local coastal communities. As livelihoods diversification allows to change and adapt structurally to unstable situation, it provides flexibility and adaptability to aid daily survival. Therefore, the development of such tourism must be based on the environmental situation of local community of the two villages which always experience relatively large. Tourism is an important sector to generate more income to improve the welfare of coastal communities;
4. Intensive and continuous efforts need to be done by the Regional Government and mining companies to minimize the negative impacts of mining activities on the sea, considering that the sea is an important source of both food and income to many fishermen living in those two research locations.

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