

SOCIAL RESILIENCE AND UNCERTAINTIES: The Case of Small-scale Fishing Households in the North Coast of Central Java

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Abstract Small-scale fisheries play a significant role in the livelihood of coastal communities in the north coast of Java. These resources, however, have been declining since the 1980s partly due to over-fishing and variability in the marine ecosystem. These factors not only generate uncertainties in the livelihood of small-scale fishers, but also affect coastal communities severely both socially and economically. Nevertheless, locally built-in mechanisms to cope with external shocks, which have been embedded within fishers' households, could be used to minimize the impact of uncertainties. This paper discusses how small-scale fishers and their families respond to such uncertainties using livelihood strategies. It also explores how fishing households build up social resilience to cope with uncertainties. These resiliencies include temporal and seasonal migration, income diversification, empowering women groups, developing work-sharing, and exploring non-fishery resources.

Introduction

One of the most distinctive features of fishing, compared with other rural and coastal activities, is the presence of uncertainties. The uncertainties arise from various sources, such as occupational risk, exposure to natural hazards and macroeconomic forces (for example, an increase in fuel prices and other input prices). The presence of uncertainty will inevitably lead to a disturbance in the livelihood of fishing families, as their income might fluctuate on a daily or seasonal basis (Bene 2006). The uncertainties might also be transferred to other fishing-related activities, thereby affecting other members of the coastal community. Furthermore, Berkes *et al.* (2001) argue that the presence of uncertainties can complicate the fishery management process. An inability to properly identify the sources of uncertainties in fisheries will not only lead to management failure, but also could wrongly address the true cause of poverty in fishing community.

Among fishing households, it is the small-scale fishers who are very prone to vulnerability associated with the presence of uncertainties. Bene (2006) and Allison and Ellis (2001) noted that fishing-related communities, particularly small-

scale fishers in developing countries, are among the most vulnerable socio-economic groups. This is due to the fact that both institutional and human capacities to address uncertainties in fishing are lower than in developed countries. Bene (2006) further noted that there is a gender-related vulnerability associated with small-scale fisheries. Women in coastal communities are more vulnerable than men, as their place in the social hierarchy may normally be lower in developing countries. Gender differences in coastal fishing communities, however, are complex, and relative places in social hierarchies can vary.

It is commonly believed that the vulnerability of small-scale fishers to uncertainty would lead to a further depressed local economy and tend to worsen poverty in coastal communities. That belief, however, overlooks the ability of fishery households to overcome uncertainties using various mechanisms. Coastal communities in developing countries, for example, have shown that social resilience embedded in their culture is an effective way to deal with unexpected shocks (Adger *et al.* 2005). These mechanisms are sometimes overlooked by authorities, so that poverty-alleviation programs initiated by the government often fail due to lack of acknowledgment of local initiatives. Their importance is also not appreciated until after the government programs fail. There is a need, therefore, to improve our understanding of the various coping and livelihood strategies that small-scale fishers and their families use to overcome the negative impacts of uncertainties. This paper is an attempt to foster this understanding. It will explore how small-scale fisher households behave in response to uncertainties caused by resource fluctuation and other source uncertainties such as social and market fluctuations. The authors will first provide a brief overview of the coastal fisheries in the north coast of Java by focusing on small-scale or artisanal fishing activities. The authors will then discuss various adaptation strategies carried out by both fishers and their families, and identify lessons learned from these observations to aid fishery management.

Brief Overview of Small-scale Fisheries in the North Coast of Central Java

The north coast of Central Java is home to thousands of fishermen who depend on fishing as a source of living. Fishing in this area is dominated by small-scale fishers (Table 1), although some larger vessels (such as purse seiners) are also found to harvest the bulk of the catch in the Java sea. The term 'small-scale' is used differently across fishing nations, therefore it is important to clarify that in Indonesia it usually refers to fishing with small boats (less than ten GT), either non-motorized vessels or vessels with an outboard motor.

Table 1 Number of fishing vessels by category in the North Coast Central Java

Year	Small-scale Fisheries (SSF) (Vessel)	Medium-Large scale (Vessel)	Total Vessel	Percent of SSF to total Vessel
1998	15560	1393	16953	91.78
1999	15724	2531	18255	86.14
2000	16639	2814	19453	85.53
2001	17598	3076	20674	85.12
2002	19288	3307	22595	85.36
2003	22812	4092	26904	84.79
2004	22676	4717	27393	82.78
2005	21939	4658	26597	82.49

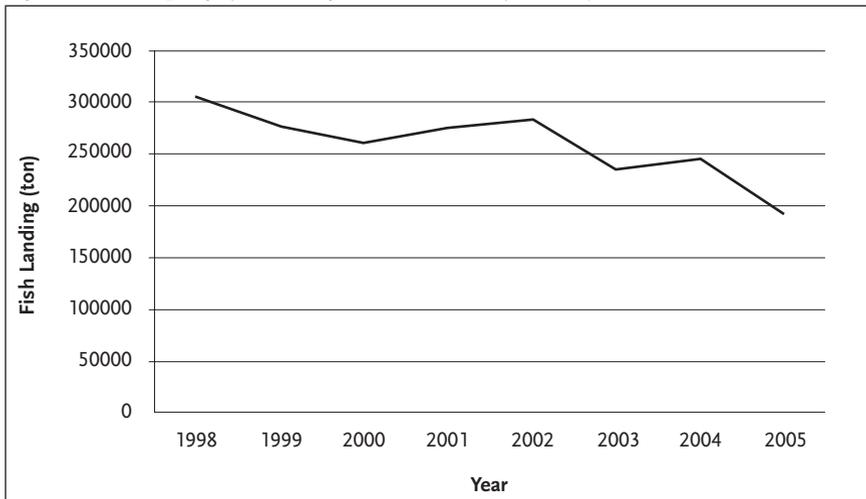
Figure 1: Map of the northern coastal area of Central Java



source: http://www.nationaalarchief.nl/aankomst/achtergrondinformatie/illustraties/kaarten/indonesie_groot.gif and http://www.penataanruang.net/taru/peta/Pulau/jwblo24anew6_struktur_pr_2023.jpg

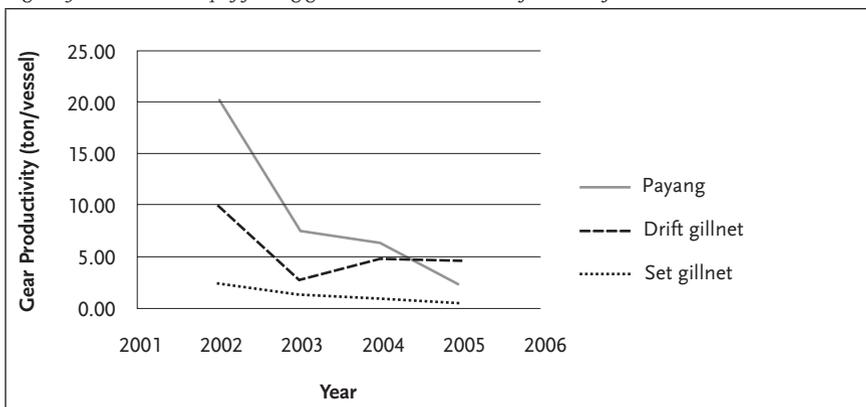
Pekalongan, Tegal and Semarang are coastal cities that have been the main hub of the fishing network in the north coast of Java. Pekalongan, for example, has been at the center of the landing of small pelagic fish which are then distributed across the country. Here, besides the craft of 'batik' (decorated clothes), fishing is still a dominant economic activity. During the 1980s, the north coast of Central Java used to be one of the major fishing areas in Indonesia, contributing to a large proportion of total landings in the country. However, the fishery experienced a decline in fish production since the late 1980s (Figure 2) due to intensive fishing pressure coupled with other causes, such as environmental degradation and natural hazards. Inundations of coastal areas now occur more frequently and mangrove forests are significantly diminishing in this area. All of these factors contribute to the decline in fish production and economic uncertainty in fishing households.

Figure 2: Small pelagic fish landing in the north coast of Central Java



The decline in fish landings in this area has led to a slow down in economic activity derived from fishing. Fishing productivity, measured by the number of fish caught per unit of gear, has been declining consequently. As can be seen in Figure 3, the productivity of three fishing gears predominantly used by small-scale fisheries, namely 'payang' (scoop net), drift gill net and set gill net, show a sharp decline over the last four years. *Payang* productivity declines from around twenty ton/gear/year in 2002 to merely two ton/gear/year in 2005, a decline of more than eighty per cent. The pattern is similar for the set gill net. Its productivity declines from 2.52 ton/gear/year to 0.45 ton/gear/year, again a decline of more than eighty percent over the last four years.

Figure 3: Productivity of fishing gears in the north coast of Central Java



The decline in catch also correlates with economic decline. Gross revenue from fishing has been declining from its peak around 3,000 us dollars per gear per year

in 2002 to around 2,000 us dollars in 2005, a decline of fifty percent. The decline in fishing revenue will certainly have multiplier effects on other socio-economic aspects such as purchasing power, family income, expenditure on health and education, and others. In fact, a recent calculation from a study by Hermawan (2006) indicates that family incomes of small-scale fishers in the north coast of Central Java vary from 20.50 us dollars per capita per month for the '*payang*' fisher to 42.50 us dollars per capita per month for the gill net fisher. If we take the World Bank standard of poverty indicator which is two us dollars per capita per day, these levels of income are certainly far below the standard since they are the equivalent of 0.67 us dollars per capita per day for *payang* and 1.40 us dollars per capita per day for gill net.

Perhaps it is worth noting that the poverty level at a national scale during the period of 2005-2006 has increased from sixteen percent of the total population to almost eighteen percent of the total population. This increase is partly due to the fact that in 2005 the government issued a decree (President Decree No 55/2005) to increase the price of fuel, including gasoline and diesel. The price of gasoline increased by 87.5 percent, while the price of diesel increased by 105 percent. Even though the price of fuel decreased in 2008, the increase in the price of diesel during 2005-2006 has had a profound impact on fishermen, since they use diesel for their engines and fuel is around sixty percent of the total fishing costs. Therefore, the fishermen face double jeopardy – uncertainty in resource availability and economic shock due to an increase in the price of fuel. The impact of the latter is much more severe since it induced inflation and reduced people's purchasing power. With this level of income, little can be done to increase the welfare of fishers. All income is spent on obtaining food. Saving is impossible, while expenditures on health and education are minimized. The level of malnutrition and other health problems are quite high in these coastal areas, indicating that the overall livelihood of fishers and coastal communities is not in good condition.

Social Resilience and Strategies to Cope with Uncertainties

How do fishers' households respond to such socio-economic disturbances? We conducted a focus group discussion (FGD) and field survey in Pekalongan and Semarang to assess their perceptions and their social resilience. In general, our findings confirm the hypothesis that fishers' households are able to adapt and develop strategies to cope with uncertainties. For example, fishing is often referred to as 'the employment of the last resort,' which implies that fishers tend to stick with their occupation no matter how risky and uncertain they are. This attitude is captured when fishermen were asked 'what would you do if the uncertainty in fishing persists?'. The majority of respondents (eighty-three percent) indicate that they would keep their job as fishermen, seventeen percent said they do not know what to do, and none of them answered that they would change to another profession. They perceived that uncertainties manifested in bad seasons are just a matter of 'bad luck' and can live with them, and they do not consider the uncertainties as the heart of the matter. One of fishermen even told us that 'the current

uncertainty and bad season for fishing are just a matter of '*salah mongso*' (wrong season) ... we aren't even bothered by it'. This finding is similar to that of a study by Salmi (2005) about Finland fishers' attitude toward fishing. She found that seventy four percent of fishers say they 'would stay as a fisherman for all my life'.

Faced with uncertainties and poverty, small-scale fishers in the north coast of Java have developed various fishing and non-fishing strategies to cope with fluctuations in production and income which affect their livelihood. These strategies, to some extent, are drawn from so-called 'social memory' (Adger *et al.* 2005) whereby various mechanisms are built up to cope with external shocks using reservoirs of practice, knowledge and values within communities.

With regard to fishing, fishers have adopted strategies which involve modifying fishing techniques, and adjusting to seasonal and spatial variation. Even though the current survey shows that fishers stick to current gears in response to a downturn fluctuation in catch, the aggregate data revealed that modifying gears has evolved over a long period of time. In the early 1990s, McElroy (1991) noted that there were dramatic changes in the variety of gears used in the north coast of Java during the last thirty years. Various types of scope nets now have been used as a complement to main gears, such as *payang*. In addition, with lack of control from the government, fishermen also modify their gear to 'trawl-like' gear locally known as '*cantrang*'. This gear has even sparked conflict among local fishermen because it scoops up everything and destroys the ecosystem. Yet, local government does not act to ban the gear unlike the case of the trawl drama in the 1980s, when the government acted swiftly by banning the gear in all areas of the Java Sea.

When local fish are difficult to find, fishermen also develop some strategies to track changes in seasonal and spatial variations of fish stock, including going fishing early. Allison and Ellis (2001) note that in the north coast of Java fishermen are able to adopt these strategies by tracking long-shore and inter-inlands migration of fish stock. Perhaps this is one of the reasons why they do not want to change professions. Traditional fishers of the north coast of Java are very well known for their mobility and follow where the fish are. Some even fish further north in the Java Sea by using their simple gears, while others fish in the west and eastern parts of the Java island, following the seasonal migration of the fish. This type of behavior however is now constrained by the political situation. Since early 2000, by means of Act number 32/2004, Indonesia embarked on a new political system- adopting decentralization of government, including the management of the natural resources such as fisheries. This shift in resource management has sparked conflict among fishermen in adjacent areas, for example between Central Java and Eastern Java provinces, which accuse each other of stealing fish resources. The strategy to adjust to temporal variation by fishing early has also created the so-called 'time interception' which imposes externalities upon other fellow fishers, so that the later fishers may suffer from diminished supply.

Declines in the availability of fish stock have also forced fishers to adjust their fish targets and consequently their gears. Fishers have now fished near shore or at the river mouth, targeting different kinds of fish. Some of these fish are small fish which are not attractive enough to be sold in the market. The catch is merely for their own consumption so as to minimize spending on food. Other strategies

involve utilizing coastal land for building fish ponds and brackish water ponds, so they switch from hunting fish to farming milkfish instead.

It is known that coastal communities and small-scale fishers are very flexible at adapting to the uncertainties by adjusting their livelihood (Salmi, 2005, Allison and Ellis, 2001). Salmi (2005), for example, refers to this adaptation as pluractivity. This includes 'wage earning pluractivity' and 'industrial pluractivity.' The former is basically a strategy to combine work so as to earn additional income, while the latter refers to diversification of business to hedge against fluctuation in the main business. Diversified livelihoods are featured in the north coast of Central Java where fishers and their families are involved in different economic activities to smooth out fluctuation in household incomes. These include opening small 'kiosks', selling daily necessities such as cigarettes, food (snacks), drinks, rice and noodles, and also encouraging other family members to work part-time at jobs, like gear and boat repairing and or as a housemaid.

As mentioned previously, fishermen and coastal communities also develop non-fishing strategies to cope with uncertainty. One of these strategies is to exploit the terrestrial ecosystem. This strategy, for example, has been observed by Perry and Sumaila (2007) in the case of small-scale fisheries in West Africa. Fishers in Semarang and Pekalongan have intensified their coastal land for farming jasmine flowers. The price of jasmine flowers is around seventy cents us dollar per kilogram to one us dollar. Fishers can harvest up to five kilograms of flowers per month, supplying additional income to the family.

Hardship and uncertainties have fostered a strong social bonding among communities. Fishermen often receive support from each other by means of work-sharing and through other strategies, such as borrowing money and helping communities in case of emergencies. Work sharing, for example, is often manifested in the form of gear and boat repair, as well as community work for health and sanitation. This type of work-sharing is locally known as '*gotong royong*' and has helped small-scale fishers to reduce the extra cost of maintenance as well as the expenditures on health and other basic necessities.

Developing strategies to cope with uncertainties is not only a responsibility of the fisher. Fisherwomen or wives of fishermen are also actively involved in dealing with uncertainties. There are two basic strategies that have been exercised by women. The first is a strategy that deals with the internal family livelihood, and the second is a strategy to deal with external forces. Within the family, women are often acting as 'finance ministers' and organize the sustainability of the family's livelihood. In order to smooth out the fluctuation in the family's income, women invest in community saving groups known as '*arisan*'. The system works as follows: each woman contributes a certain amount of money which has been agreed upon by the group, normally between one us dollar to two and one-half us dollars per rotation. So if there are ten women in a group, then there would be ten rotations in one period of *arisan*. Each week or month they meet to pick the winner of the *arisan*. The winner is chosen by random selection. The winner will receive the total amount of money collected by the group. So if each contributes one us dollar then the winner will receive a total amount of ten us dollars. This strategy is often preferred to gambling due to the low probability of winning. Here the probability

of winning is not only higher, but also the randomly selected winner could bargain with those who desperately need the money to trade the turn.

Several women work extra hours to cope with low income during the low seasons of fishing. They work as part-time 'housemaids' for families in the higher income group within the coastal area. This strategy helps to cover the cost of basic daily necessities and reduce the food budget for the family. Women who work as maids get extra food of their own as well as for their family. In extreme cases, they often send their daughters or other family members to work as professional housemaids overseas in Malaysia, Singapore, Hong Kong and Taiwan. Those who work abroad often send their wages back home and help their family to survive the hardship. At this point, it could be argued that to deal with uncertainty the labor of all family members is maximized and pooled, including children who sometime work to help their parents.

With regard to external forces, such as uncertainty of the husband's productivity, family instability and poor government assistance, fisherwomen develop several strategies to cope. First the women engage in direct selling of the fish products (Figure 4). They are usually the major seller of fish by, products and small shrimp destined to be processed as '*terasi*' (fermented shrimp). They often control the market of this product. Since this is a processed product, it lasts longer and can be sold for a longer period of time. So when their husbands do not go fishing due to bad weather or the low season, fisherwomen could still engage in economic activities and earn income for their families.

Figure 4: Women involvement in fishing activities in the north coast of Central Java



Fisherwomen also engage in other activities to deal with this kind of volatility, such as forming a group and investing in opening up a kiosk business known as, '*Kedai Pesisir*' (a Coastal Café). Here the members can buy daily necessities at

a cheaper price. They can also borrow goods at a zero percent interest rate, based on membership and trust among the members. The Café also serves as a cushion when their husbands are back home with empty pockets. Family instability often leads to family's livelihood uncertainty. Here fisherwomen in coastal areas of north Java have to adapt to such a situation. Break-up of marriage is avoided as much as possible. Nevertheless when break-up cannot be avoided, women tend to adapt to the new situation and try not to take the issue of divorce seriously. So the phrase 'life goes on' has been adopted by fisherwomen in the north coast of Java

Concluding Remarks

Fishing-dependent coastal communities in the north coast of Central Java are endlessly challenged by uncertainties arising from natural resource variability and other socio-economic forces. Variability in natural resources manifested in bad seasons and fluctuation in fish catching has profound impacts on the livelihood of small-scale fishermen and coastal communities in the north coast of Central Java as a whole. It is well known that continued decline in fish catch leads to poverty and disruptions of human well-being, such as diminished health and education, among other social ills.

Nevertheless, fishers' households have their own 'built-in mechanisms' to deal with uncertainties in the form of social resilience. This is an important asset for buffering against the effect of uncertainties. This study shows that traditional fishers have ample knowledge and strategies which could be enhanced and maintained, so as to minimize government intervention and waste of resources due to ineffective top-down derived policies. Better use of traditional social and ecological knowledge held by fishers and coastal communities must be encouraged. This study also shows that women play a greater role in the livelihood of coastal communities. Their contribution is often overlooked and is not appreciated. Yet, by empowering fisherwomen, poverty could be addressed in a more comprehensive manner. Empowerment programs which directly address women issues in coastal areas and target the right groups could benefit not only women's groups but also coastal communities as a whole. In developing countries, such as Indonesia, most government programs that target fishermen by providing direct subsidies and other economic programs such as *PEMP* (Economic Program of Coastal Empowerment) end up failing due to mismanagement at a local level. Direct subsidies given to fishermen are often misused and misallocated, while economic empowerment programs to fishermen are often a waste of money due to ineffectiveness in delivering the program. The policy which gives every poor family ten us dollars per month, to some extent, has created a slothful culture and in some areas it has induced more conflict, rather than compensating welfare loss. Some fishermen even feel they are losing their dignity as hardworking fishermen, thus creating hostility toward government and other classes of society. Yet, if the government takes into account what the local communities have done to cope with their own livelihood, the government can utilize this local knowledge and strategies to create more effective management for fisheries and coastal communities as a whole.

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