

# The Vulnerability and Resilience of Fishermen's Household Livelihoods in Lae-Lae Island, Makassar City

Idham Irwansyah Idrus<sup>1\*</sup>, Ashari Ismail<sup>2</sup>, Riri Amandaria<sup>3</sup>

<sup>1,2,3</sup>Program Studi Sosiologi, Universitas Negeri Makassar

**Abstract.** This article is a qualitative research which aiming to determine the impact of CPI reclamation on the livelihood resilience of fishermen's households. The informants were selected purposively with the main criteria have been in the fishing profession since before the reclamation. The data were obtained through interviews, observation, documentation, and focus group discussions with fishermen groups and community leaders. The results of the study found that coastal reclamation has had an ecological impact on fishing communities whose lives depend on marine ecological resources as their main livelihood; in addition, other impacts caused are the distance traveled to catch fish and market the catch to fish auctions causing high operational costs that must be incurred compared to before reclamation. The forms of livelihood resilience carry out by fishermen such as carrying out livelihood strategies, optimizing social and physical capital owned, as well as asset and financial management.

**Keywords:** Livelihood resilience, fisherman household

## 1 Introduction

Keberlanjutan The sustainability of fishing communities' livelihoods who depend on natural resources in coastal and marine areas is closely related to their ability to respond to changes in the bio-physical environment and their ability to utilize their financial resources and social capital. Environmental changes can occur naturally or intentionally by humans, and one form of intentional environmental change in coastal areas is coastal reclamation.

Reclamation activities of coastal and small island will have both positive and negative impacts[1]. mentions that the positive impacts of reclamation activities include increasing the quality and economic value of coastal areas, reducing land that is considered less productive, adding areas, protecting beaches from erosion, improving aquatic habitat conditions, employment absorption, and so on. Meanwhile, the negative impacts of the reclamation process on the environment include physical impacts such as changes in hydrooceanography, sedimentation, increase water turbidity, marine pollution, increase potential for flooding and inundation in coastal areas, damage to marine habitats and their ecosystems. In addition, reclamation will also have an impact on socio-economic changes such as the difficulty of public access to the beach, as well as reduced livelihoods [2]

The main challenge faced by fishermen beside environmental changes, they also face open access

resources, which causes them to have to move around to get maximum catchings in line with a very high risk element [3] Firth also revealed that fishing communities have similarities with farming communities. For instance, the nature of their businesses is small-scale with simple market equipment and organization; exploitation related to cooperation issues; mostly rely on subsistence production; and vary in their level and behavior of the economy [3]

Fishermen's livelihoods basically are vulnerable to risks and uncertainties from various characters, such as biophysics, abiotic, climate, environmental, biotic (eg pests, diseases), and economics. The scale of the impact of climate changes on of rural households' livelihoods will largely be determined by the size of their livelihoods exposed to a hazardous environment, so it requires the adaptive capacity of households to withstand devastating threats and the sensitivity of each household in responding to these threats. The livelihoods approach focuses on the context of livelihoods built by farmers or fishermen in using livelihood capital, institutions, livelihood strategies (selecting a compilation of assets and activities), and calculating livelihood impacts [4]

The level of vulnerability and resilience of rural households to resist the destructive forces that come into their livelihoods includes several dimensions, namely biophysical, economic, and socio-cultural. The complexity of the interconnections between these dimensions and the scale of the business managed by fishermen will determine the level of vulnerability to

\* Corresponding author : [idham.irwansyah@unm.ac.id](mailto:idham.irwansyah@unm.ac.id)

tolerate while increasing the resilience of livelihoods[5] Livelihood resilience can be understood as the capacity of the system to keep livelihoods functioning despite external forces and changes that make the system vulnerable [6] In the last decade, Tuwrote that vulnerability research has tended to emphasize threats and the sensitivity and adaptive capacity of some elements of society.

This article will analyze in depth the sources of vulnerability and resilience of small-scale fishing households in Lae-lae Island located in the coast of the Makassar Strait, right in front of the reclamation area of the Center Point of Indonesia (CPI) Makassar City. The analysis focusing in assessing the socio-economic situation of households affected by stresses that affect livelihood vulnerability and shaping adaptation strategies as well as livelihood capital mechanisms or organizations for survival.

## 2 Research Methods

This type of research is descriptive qualitative research which was carried ot in Lae-Lae Island, Ujung Pandang District, Makassar City. The informants in the study were carried out by purposive sampling, this study used data collection techniques of observation, interviews and documentation. The analytical technique used are qualitative and descriptive data analysis techniques (pre-field analysis and field data analysis).

The informants in this study were small-scale fishing households, who are fishermen with owning boats more than ten years as stated in Law Number 7 of 2016 concerning the Protection and Empowerment of Fishermen, Fish Cultivators and Salt Farmers. Despite the fact, on Lae-lae Island there are no fishermen who have fishing vessels more than five yeras, thus determination of informants was carried out purposively based on ownership of boats, fishing gear, livelihood systems or fishing, and has carried out the fishing profession for more than 10 years. Then there were 20 informants who were distributed to three sub-districts in Lae-lae Island.

The conceptual framework used in this paper is a synthesis of Sustainable Livelihoods Analysis of the DFID's framework (1999) and the rational choice theory proposed by James Coleman. The sustainable livelihoods analysis framework provides the basis for the relationship among the context of vulnerability, utilization of livelihood resources, and livelihood outcomes. Furthermore, in the utilization of livelihood resources (especially natural capital and physical capital) sourced from the bio-physical environment, the community will develop a wise culture core. The core of wise culture is technological and economic arrangements in the utilization of livelihood resources

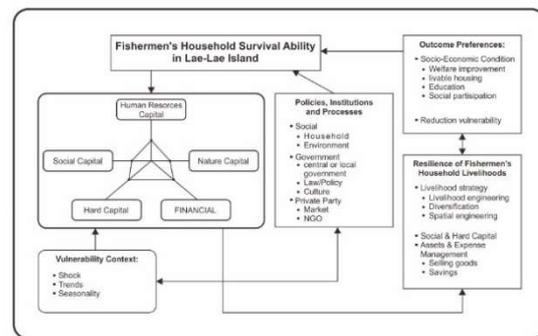


Fig 1. Conceptual Framework

## 3 Result and Discussion

### 3.1 Sources of Vulnerability of Lae-lae Island Fishermen's Household Livelihood

The vulnerability of fishermen's household livelihoods in Lae-lae Island can be categorized into pressures from external community factors that are long-term and broad-scale (trends); shocks that come in a short time that disrupt sources of livelihood (shock), and seasonal disturbances or stresses (seasonality). The sources of vulnerability are the socio-cultural and ecological changes that they have experienced since living in Lee-lae Island, especially since the reclamation activities of the Center Point of Indonesia began. Changes in government resulting in various policies, including the development of tourist areas in Lae-lae Island are also closely related to the environmental changes. The ongoing social, economic, cultural, ecological, and political changes also become the context for the livelihood security of small-scale fishing communities (Table 1).

Table 1. Sources of Vulnerability of the Fisherman Community in Lae-Lae Island

Dimension/ Aspect	Source of Vulnerability	
	Short Term & Seasonal	Long Term & Broad
Nature	<ul style="list-style-type: none"> <li>Illegal fishing</li> <li>Trash from CPI</li> </ul>	<ul style="list-style-type: none"> <li>- Weather anomalie</li> <li>- Rising sea levels</li> <li>- Development of fishing technology</li> <li>- Decreasing water quality due to household waste</li> </ul>
Social	<ul style="list-style-type: none"> <li>- Fisherman conflicts, both between classes and within same classes</li> </ul>	<ul style="list-style-type: none"> <li>- Status of land ownership/residence</li> </ul>
Economic	<ul style="list-style-type: none"> <li>- The uncertainty fuel prices</li> <li>- The unstable price of fishing catches</li> </ul>	<ul style="list-style-type: none"> <li>- Expansion of international fishing companies</li> <li>- Job opportunities in other sectors</li> <li>- Consumptive lifestyle</li> <li>- Economy Crysis</li> </ul>

Political	- Subsidy or assistance policies that are not well-targeted	- Leadership crisis - Development policies that are not oriented towards sustainability - (CPI reclamation)
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Sources of vulnerability to household livelihoods in fishing communities in Lae-lae Island can be caused by methods or techniques for utilizing fishery resources in the form of using prohibited techniques (illegal fishing), such as the use of bombs and trawlers, as well as fishing with modern technology. Illegal fishing techniques will have a direct effect in the short term, namely the death of small fish, damage to aquatic plants, and contamination of deposit feeder animals (shellfish, snails, lokan). In addition, illegal fishing behavior and the use of modern technology in fishing can also trigger conflicts among fishermen.

The development of modern fishing technology can be a context for the vulnerability of household livelihoods in the long term because modern fishing technology is only aimed at achieving economic benefits, without considering the sustainability aspects of fishery resources. This condition will also cause small-scale fishermen to be forced to compete with large fishing companies and even international ones.

From the social dimension, the status of land ownership and residence as many as 426 heads of families who inhabit Lae-Lae Island currently do not have clear rights, so they are a source of long-term vulnerability. Even in 1998, some of the island's residents were relocated to a new residential area, namely the Untia Fisherman's Village due to the desire of the government and investors to make Lae-lae Island a tourist and entertainment destination. The residents are feeling anxious again at this time, because of the plan to develop the CPI reclamation to Lae-lae Island.

Another form of sources of vulnerability to household livelihoods in the fishing community in Lae-lae Island is the fluctuation of fuel prices and fluctuations in the price of fishery commodities. The nature of the economic uncertainty of fishery resources in the short term can be a shock. Sources of vulnerability in the long term from the economic dimension are the pervasive consumptive lifestyle, the growth of job opportunities in other sectors, especially industry and the non-formal sector, as well as the occurrence of an economic crisis.

The political dimension that becomes a source of vulnerability for fishermen in Lae-lae Island in the short term or seasonally is the subsidy policy or social assistance that is not well targeted. In fact, this condition has created a conflict among residents who should receive assistance and existing social institutions (RT/RW) and residents who receive assistance but do not meet the requirements as target recipients of assistance. For the long term, it is a development policy that is not oriented towards sustainability. This can be seen from the reclamation activities carried out, starting from the reclamation of Losari Beach in 2003 and continued with the reclamation of CPI since 2010 with an area of 157.23 Ha

## 3.2 Livelihood Resilience of Fishermen Households in Lae-lae Island

Resilience is the ability of a system to absorb disturbances and reorganize when undergoing change, so it still maintains its basic [7] Livelihood resilience is seen as the ability to face shocks or economic crises so that they can survive, are still in a stable position, do not experience prolonged adversity, and starvation. The forms of resilience vary according to the resources they have (Saraswati and Dharmawan, 2014).

### 3.2.1 The Capital of Livelihood Resilience of Fishermen Households

#### 1) Human Resource Capital

Human resource capital consists of the age group of the informants, the number of working household members, the level of education, and the skills possessed. In general, the level of education of the majority of informants did not have education or not graduated from elementary school, which is equal to 55%, the remaining 45% did not graduate from junior high school, and senior high school. Most of the informants are in the age group of 25-45 years, which is 75%, and the remaining 25% are in the 46-60-year age group. Besides, there were eight informants who do not have skills on catching. These skills are boat-building and carpentry. The work of making boats is usually done on a temporary basis and being a construction worker they you get a call from other residents who need labor. Similarly with carpenters, they generally work as construction workers in the CPI area where housing construction is currently underway by developer PT. Ciputra.

The allocation of workers in the household shows that the household members who work in general are the husband as the head of the household, the wife and children who do not continue their study. The wife's work includes selling fish leftovers to other residents, selling traditional cakes, and opening a business selling mixed goods. In general, boys work as fishermen and as construction workers, while girls work as shopkeepers or as household assistants in Makassar City

#### 2) Hard Capital

Hard capital includes area of residence, land ownership status, boat ownership, types of fishing gear, ownership of motorized vehicles, ownership of household electronic equipment. The land controlled by the household is in the form of rice fields, yards, and fields. The area of land where they live is almost evenly distributed, ranging from 90-100 m<sup>2</sup> with all ownership statuses being rights of use, without certificates of ownership or title rights and only based on proof of payment of Land and Building Tax (PBB). All informants have boats (sampans) equipped with outboard engines; ownership of fishing gear based on fishing methods. There are seven people who go to fishing rods, nine people who use nets, and four people who look for fish by diving. The rest own a motorized vehicle, namely a two-wheeled motorbike which is parked across the street at the Kayu Bangkoa ferry pier

and is only used for activities in Makassar City, such as going to the market or being used by children for work and school. Almost informants have electronic equipment, which is one unit of TV, all informants have a mobil phone, and few informants have refrigerator due to the limited availability of electricity. In Lae-lae Island, the electricity source uses a generator engine and only operates at night, from 18.00 to 06.00 in the morning.

### 3) Nature Capital

Lae-lae Island, which is located on the coast of the Makassar Strait, has a very large capture fisheries potential. It is known that the potential for capture fisheries in South Sulawesi is 620,480 tons per year, of which approx 307,380 tons per year comes from the Makassar Strait. From the geographical aspect, it is right in front of CPI and the Kayu Bangkoa ferry port with a distance of approximately 1.3 Km, so it can be reached in 5 minutes by motorboat. This condition causes the daily activities of Lae-lae Island residents to be carried out in Makassar City, such as for shopping for daily necessities, working, and children's school. On the other hand, residents of Makassar City make Lae-lae Island a tourist destination on weekends or on other national holidays.

The condition of the small island, densely populated settlements dominated by semi-permanent houses and connected by a two-meter wide footpath makes Lae-lae Island free from motor vehicle pollution. There is a white sand beach in the northern part of the island which has been equipped with 3 gazebos and several stalls managed by residents, so that Lae-lae Island has become a tourist destination for Makassar City residents and other immigrants. In addition, there are also historical relics in the form of two Japanese bunkers, an ancient well, a tunnel that is thought to be connected to the center of Makassar City and the accompanying stories or myths.

### 4) Social Capital

Social capital can be seen from network ownership, involvement in an association, and the strength of relationships among community members. All informants have good relations with other community members. The residents have good interactions and help each other. This shows the general picture of social life in rural areas which is still very good. The involvement of informants in associations shows that they are involved in social associations such as social gatherings and fishing groups. Network ownership also shows the same thing where all households have social networks. Social networks can help such as providing financial assistance, access to jobs, and providing knowledge to increase business.

### 5) Financial Capital

Financial capital includes access to loans, the ability to save or invest, and the receipt of remittances. Almost all informants' household have access to loans with their neighbors and relatives, and only a few of informants' household get loan money from banks. Generally, they borrow goods or kitchen needs to meet their daily needs.

The level of household saving ability varies, where households that cannot set aside is about 70% of their income, can set aside account for 10% of their income but not regularly, and the rest can set aside their income regularly. The form of savings is generally in the form of gold jewelry investment, with the consideration that if one day they need money they can be pawned or sold quickly.

For remittances, there are only three households whose family members sometimes work in Kalimantan as laborers for large fishing companies. The number of remittances is generally not large and varies depending on the volume of work produced, and sometimes most of them have been taken in the form of loans before they work.

### 3.2.2 The Livelihood Resilience of Fisherman Household

The concept of livelihood resilience cannot be separated from the concept of livelihood strategies. Dharmawan suggests that in the sociology of livelihood, the notion of livelihood strategy is more directed to the strategy (2007). The concept of a livelihood strategy was developed in England in the late 90s. The development approach with a sustainable paradigm seeks to correct the modernization paradigm which is generally known to be environmentally unfriendly. Along with the emergence and widespread of the concept of sustainable development, the term sustainable livelihood is also introduced, which means that every human endeavor to achieve a degree of fulfillment of its economic needs must consider ecology in a fair and balanced manner. In other words, the achievement of the degree of social welfare must be approached through a combination of economic activity with the use of resources that lead to livelihoods [8]

#### 1) Fisherman's Household Livelihood Strategy

The income condition of small-scale fishermen in Lae-lae Island (Table 2) is uncertain due to dependence on weather conditions and readiness to go to sea, including health and technical matters such as weather conditions. boats, engines, and availability of fuel. The income they get for each time they go to sea ranges from Rp. 100,000, - to Rp. 300,000, -, where in 1 week they usually do fish activities from four to five times. Thus, the monthly income earned is IDR 1,600,000 to IDR 4,800,000. The number of dependents for each family also varies from three to eight people, causing the number of monthly household expenses to be different. The monthly expenditure of small-scale fishermen is between Rp. 1,500,000 to Rp. 4,300,000, -. The total expenditure includes operational costs incurred by fishermen every time they go to sea and maintenance costs for other tools.

Based on the results of research and observations in the field, there are three livelihood strategies carried out by small-scale fishing communities on Lae-lae Island, namely: (1) double livelihood patterns; (2) optimization of family roles; and (3) utilizing social relationships (networks).

Not all household informants of small-scale fishermen in Lae-lae Island have a double income pattern, some of them do other jobs because they have other skills and do other jobs but remain in the fishing sector, namely working in large fishing companies that carry out fishing activities in Kalimantan (spatial engineering). Fishermen who have boat-building skills, generally take this job if they get a call from another friend who has a boat-building business. The position they hold is as laborers with wages paid per day of Rp. 75,000 to Rp. 100,000, - depending on the volume of work carried out. There are also fishermen who take advantage of the time when they do not go to sea because of the weather by working as construction workers, both in temporary housing development projects at CPI and elsewhere in Makassar City. The wages they receive as laborers are IDR 100,000 per day and are paid every weekend.

Fishermen who choose to work on large fishing vessels are contracted every six months with a wage of IDR 4,500,000 monthly. Generally, fishermen take wages from two to four months in advance which are used for living expenses for the families left behind, children's school fees, to pay debts, pay down payments for motorbikes or to buy electronic equipment. The work undertaken is as an angler and diver. The high risk that must be faced and the absence of health insurance or death insurance so that this choice of work has begun to be rarely done by fishermen on Lae-lae Island. For the four informants who are still doing it, they take this choice if they face certain conditions that require immediate financing.

Involvement of family members in the fulfillment of family livelihoods, especially in fishing families, is common and can be found in all fishing communities. In South Sulawesi, in line with [9] stated that the involvement of fishermen's wives is the actualization of Bugis-Makassar values and the process of adaptation to the social environment in which they live.

The results of the study found that almost of small-scale fishing households in Lae-lae Island involve their wives and only few who involve children in fulfilling their livelihood. The work carried out by the wife is generally still related to the husband's livelihood, namely selling the rest of the catch, either sold directly to other islanders or processed into salted fish before being marketed. Marketing of salted fish is carried out in the white sand beach tourist area in Lae-lae Island or on Gusung Island by entrusting it to the shop owner and sharing the results. Some of the other wives opened a business selling mixed goods for daily needs in front of the house or selling cakes around. According to informants, the income they receive does not significantly improve their economic status, but can only help meet their daily needs

The involvement of children in fulfilling household expenses, found differences in the types of work between boys and girls. In general, the children of small-scale fishermen in Lae-lae Island only graduated from junior high school or did not finish high school, this condition was caused because there were only one elementary school and one junior high school. Boys usually join the head of the household working as

fishermen or working as construction workers, while girls generally work as shopkeepers or household assistants in Makassar City. The income earned is partly given to parents and partly used for personal needs, including operational and transportation costs in carrying out work

Solidarity among residents, especially small-scale fishermen in Lae-lae Island looks very strong based on the social relations that have been built. This is due to the long-standing relational ties, most of the current residents are the third and fourth generations who inhabit the island. Some of them are even bound by blood relations and marriage. According to informants who have skills other than fishing, they have the knowledge and skills to build boats or carpentry because they were initially invited to help or work. Finally, until now if the weather conditions are not favorable and there are people who need labor, either to build boats or as construction workers, they are called to work. In addition, fishermen also mutually invite if any of them experience obstacles, both financial and technical, so they cannot go to sea. Mainly fishermen who do fishing by diving, usually need from four to five people at a time to go to sea. The information obtained, the informant said that diving requires special personnel to drive the boat, control the compressor engine, and at least two divers to help each other and take care of each other underwater

Strong social relations are also seen among the fishermen's wives, they help each other and lend each other goods or their daily food and drink needs. According to informants, they avoid borrowing money from neighbors or family because they don't want to be in debt. Usually what they borrow is only kitchen necessities, such as rice, sugar, fish, etc., which will be returned according to what they borrow. The wives also invite each other if there are activities carried out, either by the sub districts or other institutions.

## 2) Aset and Expense Management

The assets referred to here are physical capital and financial capital. The condition of residence that does not have a title or certificate of ownership causes residents, especially small-scale fishermen, to be unable to use it as a source of finance to increase capital or increase the capacity of fishing gear. In fact, according to them, they do not do anything to repair or improve the quality of the building from a semi-permanent house to a permanent house because of fears that the government will relocate at any time. Even though houses generally stand on 7 x 13 m<sup>2</sup> and 7 x 15 m<sup>2</sup> land, they pay the land and building tax every year.

All fishermen own a boat equipped with an outboard engine, which is generally obtained by buying, either in cash or in installments using a profit-sharing system. According to the informant, some of them had received engine assistance from the government through a fishing group, but were eventually sold because the capacity and size of the engine did not match the type of boat they had or already had an engine of the same type. The proceeds from the sale are then distributed to members of the fishing group. Other assistance that has been obtained is in the form of fishing nets.

The excess income earned is generally saved, but because the amount is not much, it is only kept at home. In addition, they save it in the form of investment in the form of gold jewelry. According to the informant, this was done because if they suddenly needed money, they could quickly pawn it or even sell it. As for loans through banks or other financing institutions, small-scale fishermen on Lae-lae Island do not do so because they do not want to be in debt and do not have access to loan guarantees.

Under certain conditions, the weather is not favorable for fishing, there is no other works to do, or the income of other family members is less, so they generally save in terms of spending on secondary needs. These savings include reducing the use of cellular phone credit, and reducing the amount pocket money for children who are still in school. They do not make savings in terms of daily meals. According to the informant, eating rice and fish three times a day is a non-negotiable staple, so sometimes if they are really in trouble, they prefer to borrow rice, side dishes, or other kitchen needs from their family or neighbour.

## 4 Conclusion

The vulnerability of small-scale fishermen's household livelihoods in Lae-lae Island can be categorized into: pressures from external community factors that are long-term and broad-scale (trends); shocks that come in a short time that disrupt sources of livelihood (shock), and seasonal disturbances or stresses (seasonality). The sources of vulnerability are the sociocultural and ecological changes that they have experienced since living in Lee-lae Island, especially since the reclamation of the Center Point of Indonesia (CPI) started. This vulnerability has an impact on household livelihood resilience, where there are five resilience capitals, namely; natural capital, human capital, physical capital, social capital, and financial capital. With this capital ownership, small-scale fishermen in Lae-lae Island apply two forms of livelihood resilience, namely livelihood strategies and asset and expenditure management. There are three livelihood strategies carried out by small-scale fishing communities in Lae-lae Island, namely: (1) double livelihood patterns; (2) optimization of family roles; and (3) utilizing social relationships (networks).

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