

## The Impact of Floods on Fish Cultivation Business in Floating Net Cages in Sungai Alang Village, Karang Intan District, Banjar Regency, South Kalimantan



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**ABSTRACT:** The flood that hit Sungai Alang Village resulted in many floating net cages being lost in the flood, so many farmers lost their cages and caused losses for fish farmers. The aims of the study were to analyze: 1. The economic impact of floating net cage fish cultivators' losses. 2. The impact of social losses experienced by fish farmers. This study uses a survey method, the analysis used is business analysis and descriptive. The results of the analysis of the impact of flooding on fish cultivation in floating net cages in Sungai Alang village: 1. The economic impacts that occur are the loss of cages, loss of fish and damage to nets which result in farmers' losses. 2. The social impacts that occur are affecting the education of family members who continue to university cooperation from the community in dealing with flood disasters, changes in business due to flooding from fish farming in cages to fishing, gardening, cutting sap, raising chickens and selling vegetable.

**KEYWORDS:** Flood, floating net cages, impact, economy, social

### I. INTRODUCTION

The flood disaster that hit South Kalimantan in early 2021 caused flash floods in 11 of the 13 regencies/cities in South Kalimantan, some of which lasted for two weeks, with water levels reached more than 1 meter. One of the districts affected by flooding in South Kalimantan is Banjar Regency. Floods as high as 2 meters submerged 7 sub-districts in Banjar Regency, South Kalimantan (Tim detikcom – detikNews Wednesday 13 Jan 2021 13:35 WIB). The seven sub-districts are Pengaron District, Astambul District, Martapura City District, East Martapura District, West Martapura District, Karang Intan District including Sungai Alang Village and Sungai Tabuk District. East Martapura District, namely Dalam Pagar Village. Martapura sub-districts are located in the villages of Tanjung Rema, Bincau Muara, Bincau, Tambak Baru, and Murung Kenanga. Astambul District, precisely in Pingaran Ulu Village, Sungai Pinang District, namely the Belimbing lama Village, Belimbing baru village, Bakula Rantau, Nangka Rantau, and Pinang River. Pengaron District, namely Lobang Baru, Benteng, and Lok Tunggul Villages and Sungai Tabuk District, precisely located on Lok Buntar Village.

Banjar Regency has complete fisheries potential, which public waters and marine waters (coastal areas). This potential has been utilized by the community for cultivation and catching activities, the cultivation activities carried out by the community include the activities of cultivating ponds, floating nets, cages and ponds. While fishing activities carried out by the community include fishing activities in marine waters and public waters (reservoirs, rivers and swamps). (Department of Marine and Fisheries Banjar Regency 2020). The results of Mustika's research (2021). The catfish farming business in Banjar Regency is financially profitable and feasible to develop them.

The Banjar Regency area, especially the Karang Intan District itself, is dominated by floating net cage (KJA) cultivation activities. This KJA cultivation activity is carried out by looking at the potential of their own area, one of which is a river that is used by cultivators in carrying out KJA cultivation activities. Commodities produced generally include tilapia, carp, and catfish. One of the villages in Karang Intan sub-district that mostly engages in the cultivation of floating net cages is Sungai Alang village. The flood that hit Sungai Alang Village resulted in many floating net cages being lost in the flood, so many farmers lost their cages and caused losses for fish farmers. The technology of fish cultivation with the floating net cage system is carried out with an intensive pattern, namely the stocking of fish with high density and the use of commercial feed in the enlargement process. Intensive cultivation

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patterns do not make the carrying capacity of the environment a limiting factor, generally having an impact on decreasing environmental quality (Ardi, 2013).



Figure 1. Number of Karamba in Alang River before flood



Figure 2. Number of cages left after the flood in the Alang River

Floods that hit Banjar Regency caused many fish cages to be damaged and lost in the flood. It can be seen in the picture that before the flood disaster most of the Alang River was covered with floating net cages, but due to the flood many cages were lost and damaged, resulting in economic and social losses for farmers.

Research purposes:

1. The economic loss impact of floating net cage fish cultivators
2. The impact of social losses experienced by fish farmers

## 2. RESEARCH METHODOLOGY

### Research sites

The research location was determined purposively in Sungai Alang Village, Karang Intan District, Banjar Regency, the research respondents were fish cultivators who owned: karamba, floating nets that has been affected by flooding.

### Basic Research Methods, Data Collection Techniques and Data Types

This study uses a survey method, limited to the information collected (Sugiyono, 2014). Data collection techniques used interview techniques using questionnaires related to fish farming businesses affected by floods. Sources of data collected consist of primary and secondary data related to fish farming businesses affected by flooding. The type of data collected is quantitative and qualitative data.

### Data analysis method

Objective one is analyzed by descriptive analysis and business analysis.

The analysis steps are as follows:

1. Identification of damage caused by flooding to cultivation
2. Identification of fish loss due to flooding
3. Assessing the damage caused by flooding

$$TC = P \times Q$$

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information:

TC = Total value of flood damage (IDR/q)

P = Value of flood damage (IDR/unit)

Q = Amount of flood damage (units)

4. Assess the loss of fish

$$TR = P \times Q$$

Information:

TR = Revenue lost due to the release of pet fish (IDR/kg)

P = Price of fish lost due to flood (IDR)      Q = Number of fish lost due to flooding (kg)

The second objective is to use descriptive analysis to describe the impact of flooding on the social conditions of the farming community (in the form of effects on education, cooperation, and business changes). The information collected is then grouped and then compiled and analyzed in a qualitative descriptive manner. Qualitative research methods are often called naturalistic research methods because the research is carried out in natural conditions (Sugiyono, 2014).

### 3. RESULT AND DISCUSSION

The results of the study were from 95 karamba cultivators who owned cages of 2-19 units/person. They have been working on these cages since 1997. The cages owned by farmers are made of nets with wooden and bamboo frames with an average area of 5 x7 meters per cage. Types of fish kept mostly Tilapia with a production period of 4-6 months.

#### 1. Economic Impact of Floods

Floods that hit Banjar Regency caused the loss and destruction of cages owned by cultivators. The number of cages that were lost were 257 out of 490 cages owned by farmers in Sungai Alang village, it can be seen from Table 1.

**Table 1. Types of losses for floating net cage cultivators due to flooding in Sungai Alang Village, Banjar Regency**

No.	Loss Type	Number of Cultivators (person)
1.	Lost cage kar	71
2.	Fish mortality and fishing net damage	13
	Total	84

Source: Pokmaswas Fishery 2021

The impact of the early 2021 floods on fish farmers in Sungai Alang Village resulted in losses in the form of the loss of cages due to being dragged by collapsed material carried by flood currents from the upstream of the Alang river. The 71 cages that were lost sank to the bottom of the river so that they could no longer be used by cultivators. Rutkayová (2017). The total assessed loss of fish in pond aquacultures caused by recent extreme flood events was 54.2%. The most numerous losses of fish were not achieved in 2002 of extreme events in contrast to logical assumption. Based on the statistical evaluation, carp is significantly ( $P < 0.001$ ) less vulnerable (or susceptible to losses) than tench, grass carp, pike, and perch. The study reveal led differences between the reactions of diverse fish species to flooding and different susceptibilities to flooding within groups of juvenile and adult fish when considering fish species and their age category. This study summarizes the knowledge about the losses of fish stock in pond-based aquaculture and exposes pilot findings about the species sensitivity and loss rate during flood events. The outcomes also evaluate flood impacts on different aquaculture companies at the same time, and help them to deal with flood risk management Phimpakan (2014). This article reviews evidence about the impacts from flooding and drought or low flows on fish cage culture in rivers in Thailand. Major floods damage cages, result in fish escapes and kill fish while low flow results in water depths too shallow for cages, increasing effective fish densities, which when combined with poor water circulation, leads to low dissolved low water quality. Floods and droughts are a significant source of financial losses. Farmers may be forced to oxygen concentrations and poor harvest carly sell fish at smaller-than-standard size and thus at a low price. Losses due to floods and droughts can be reduced by improving management of risks at farm and reach level.

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**Table 2. Number of floating net cages lost due to flooding in Sungai Alang Village, Banjar Regency**

No.	Number of Karamba Lost	Cultivator (person)
1	1-3	40
2	4-6	24
3	6-9	5
4	10-13	2

Source: Pokmaswas Fishery 2021

The number of cages lost for each cultivator is different where 40 cultivators lose cages with a total of 1-3 pieces, 24 farmers lose 4-6 cages, 5 farmers lose 7-9 cages and the most who lose cages are 2 people where cages are lost 10-13 pieces.

**Table 3. Value of losses for floating net cage cultivators due to flooding in Sungai Alang Village, Banjar Regency**

No.	Value of loss (IDR/person)	Cultivator (person)
1	5.000.000 - 25.000.000	35
2	26.000.000 - 45.000.000	22
3	46.000.000 - 65.000.000	11
4	66.000.000 - 95.000.000	8
5	96.000.000 - 115.000.000	2
6	115.000.000 - 135.000.000	1
7	>136.000.000	5

Source: Pokmaswas Fishery 2021

The value of losses experienced by fish cultivators in cages due to flooding in the form of loss of cages and their contents, fish deaths and damage to nets varies for each farmer. 35 cultivators suffered a loss of IDR. 5,000,000 – 25,000,000, 22 cultivators suffered a loss of IDR. 26,000,000 – 45,000,000, 11 cultivators suffered a loss of IDR. 46,000,000 – 65,000,000, 8 cultivators suffered a loss of IDR. 66,000,000 – 95,000,000, 2 cultivators suffered a loss of IDR. 96,000,000 – 115,000,000, 1 cultivator suffered a loss of IDR. 115,000,000 – 135,000,000 and 5 cultivators suffered a loss greater than IDR. 136,000,000 and even suffered a loss of IDR. 300,000,000.

### 2. Social Impact of Flood

The social impacts experienced by fish cultivators in cages are in the form of effects on education, cooperation/social interaction before and after the flood, changes in business, due to flooding.

The effect of the flood on the education of the cultivator's family did not have much of an impact on education at the elementary – high school level, but had an impact on families whose family members studied at university, because the costs were quite large for education in universities which were usually paid per semester together with the fish harvest. Pets, so that due to the flood that caused the loss of cages and fish, it was difficult for them to pay the cost of education in higher education. Nurhayati (2012) Tidal floods in Semarang District have physical, social, economic and environmental impacts. The impacts such as damage to public facilities buildings, disruption of educational activities, loss of material, disruption of economic activities (unable to work, late for work) and water pollution due to tidal flooding that occurred.

The cooperation that occurs with cultivators during a flood, they work together to secure their cages when a sudden flood hits their cages. The mutual cooperation that they do by tying their cages together is even stronger by adding ropes and cutting down trees that fall towards the river. Kurnisari (2014) at the community level, social networks are a form of adaptation for fish farmers to cope with the effects of flooding. The social network can guarantee sources of capital, sources of labor, and sources of science and technology. Further intervention is needed in the response to emergency response and rehabilitation of production facilities, because the relationship that is currently formed has not touched these two aspects.

Changes in business caused by the flood are changes in the business of cultivators whose cages are lost due to flooding with other businesses such as: catching fish, gardening, cutting sap, raising chickens and selling vegetables. This work is done to earn a daily living and raise capital to carry out the karamba business again. Yunida (2017) the economic impact in Batu Benawa District due

