The Impacts of Striped Snakehead (Channa striata Bloch) Fish Farming in Net Cages on Social, Economic and Environmental aspects in Bangkau Village, Hulu Sungai Selatan

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Abstract—The purpose of this study was to analyze and identify the impacts of striped snakehead (Channa striata Bloch) fish farming in net cages on socio economic and environmental aspects. This study was a survey research. Location determination in Bangkau Village, Hulu Sungai Selatan Regency, South Kalimantan Province, Indonesia was done purposively because this area was a center for cultivating striped snakeheads in Hulu Sungai Selatan Regency. The collection of respondent data in this village was carried out in a census of 20 people from the whole population of cultivated striped snakeheads in net cages. The effect on social was done by identifying the effect of social aspect, the economic aspect determined by analysis used was the calculation of profit (π) and payback period (PP), while the environmental aspects, it was done by identifying the measurement of water quality. The results showed that from the social aspect, this business influenced the use of labor in its business, benefits obtained from the business of cultivating this striped snakeheads varied between 627,433.33 IDR to 9,789,533.33 IDR per year, while the payback period was 2.23 years. This cultivation effort from the environmental aspects of water quality is still within the class 3 water quality classification tolerance limit.

Keywords—Striped Snakehead, Net Cages, Social Economic and Environmental Effect.

I. INTRODUCTION

Marine and fisheries development in Indonesia is an inseparable part of overall economic development and must support the realization of an advanced, resilient and efficient economy characterized by the ability to prosper the lives of fish farmers and fishermen while at the same time enhancing their ability and independence in promoting the development of the fisheries sector and marine. Bangkau Village is one of the villages in Kandangan Subdistrict, Hulu Sungai Selatan Regency, South Kalimantan Province Indonesia. Livelihoods in general are as fishermen and farmers and a small part as fish farmers in net cages, Bangkau village is geographically classified as swamp area. One effort to realize an increase in the welfare of fish farmers and fishermen is to increase the production and productivity of fisheries businesses to achieve self-sufficiency in protein-sourced food so as to increase income while improving nutrition for all family members. In this case, Striped snakehead (Channa striata Bloch) fish farming can be an option in increasing family income. Channa stirata in local fish known as “haruan and gabus” in English is known as the common snakehead, snakehead murrel, chevron snakehead and striped snakehead. The snakehead name refers to the shape of the head that resembles a snake's head. While the scientific name is Channa striata Bloch (Weber, M & Beaufort, 1912). The potential of aquaculture resources is quite large with various types of fish and economically valuable biota that allow it to be cultivated, but its utilization has not been fully maximized so that the contribution to development and the economy in general and the improvement of living standards of fish farmers in particular is not optimal. The potential that is so broad should be used effectively and efficiently in fish farming. Utilization of swamp land for fisheries is still dominated by capture fisheries activities whose productivity tends to decrease, along with the increasing population growth, the need for protein sourced from fish also increases while the production of fragrant fish tends to continue to even decline in production. Capture fisheries production,
especially the production of fragrant cork fish in Hulu Sungai Selatan Regency can be seen in table 1 as follows:

Table 1. Data on Haruan Fish Production in Hulu Sungai Selatan Regency in 2011-2017

| Description | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|-------------|------|------|------|------|------|------|------|
| Total       | 1.12 | 1.10 | 1.09 | 1.21 | 1.10 | 1.09 | 1.08 |
| Production  | 6.7  | 5.5  | 4.8  | 1.2  | 7.3  | 9.3  | 9.4  |

Source: Processed Capture Fisheries Statistics Report (2018)

Destructive fishing is one of the causes of reduced stock of cork fish in public waters. Fresh fish in this area is a type of fish that has a high economic value so that the demand for fish availability will be directly proportional to the selling price in the market, the higher the demand with the decreasing stock will increase the selling price, but when the stock is high, the price also down, this results in haruan fish being one of the fish that causes inflation in the South Kalimantan area (BPS, 2018).

To find out the social, economy and environmental impacts from the cultivation activity of striped snakeheads fish farming in net cages, it is necessary to carry out this research.

II. METHODOLOGY

2.1 Place and Time of research
The location of this research was conducted in Bangkau Village, Kandangan Subdistrict, Hulu Sungai Selatan Regency, South Kalimantan Province, Indonesia, selected purposively or deliberately by considering the villages that had the most cultivators of striped snakehead in stepped net cages. This research was conducted starting from November 2018 to February 2019.

2.2 Population and Sample
The population of this research was fish farmers who carried out of striped snakeheads fish farming in net cages who also worked as fishermen in Bangkau village, Kandangan Subdistrict, Hulu Sungai Selatan Regency, South Kalimantan Province, Indonesia.

2.3 Data Collection Technique
Data collection methods used in this study was survey and interview methods using questionnaires (Sugiyono, 2008). Primary and secondary data were recorded both in the form of the results of interview questionnaires with respondents as well as existing data on government agencies or institutions associated with this research.

2.4 Data Analysis Method
Primary and secondary data that had been collected were made in the form of tabulation, then the data were processed using several quantitative descriptive analysis tools to explain the social, economic and environmental effects which include financial analysis and payback period analysis, and qualitative descriptive analysis tools to explain the general description social, economic and environmental influences.

2.4.1. The Influence of Striped Snakehead Fish Farming on Social Effects.
The social effect of striped snakehead fish farming in net cages is identifying how much labor is used and its to have were recorded in the form of the results of interview questionnaires.

2.4.2. The Influence of Striped Snakehead Fish Farming on Economic Effects.
The economic effects of striped snakeheads fish farming in net cages is said to have a profit if the total value of revenue is greater than the total expenditure. This profit analysis (Izmirian, H.et al. 2018) can be formulated by:

\[ \Pi = TR - TC \]

where: \( \Pi \) = Profit (IDR)
\( TR \) = Total Revenue (IDR)
\( TC \) = Total Cost (IDR)

Whereas to calculate the Payback Period the formula is:

\[ PP = \frac{investment}{profit} \]

2.4.3. The Influence of Striped Snakehead Fish Farming on Environmental Aspects.
The environmental effects caused by striped snakehead fish farming activities in net cages were in the form of impacts environmental aspects and for the striped snakehead populations were carried out by measuring in situ water quality which includes pH, temperature and dissolved oxygen (DO), fiber water quality measurement compared to water Quality Classification Class 3 based on PP No. 82 Year 2001.

III. RESULTS AND DISCUSSION

3.1 Characterisics of Respondents
The characteristics of respondents were showed in table 1 as follow:

| No | Respondent  | Ages (Years) | Fish Farming Experiences (Years) |
|----|-------------|--------------|---------------------------------|
| 1  | Ambri       | 53           | 10                              |
| 2  | Pidi        | 45           | 8                               |
| 3  | Ahmad Kusasi| 53           | 10                              |
Experience of Fish Cultivation. Cultivated striped snakehead farmers who had longer experience tended to be more successful than those who were not experienced. The relationship of experience with the amount of profit can be seen in the following graph:

![Graph of Comparison of Experience Relationships with the Number of Profit](image)

Fig. 1: Graph of Comparison of Experience Relationships with the Number of Profit (Processed Primary Data, 2019)

Figure 1 above shows that there is a tendency for the longer the experience of the fish farmers in carrying out the business, the greater the profit generated, therefore the experience of the striped snakehead cultivation business is one of the supporting factors in the business, the longer a person conducts fish farming business, the better to overcome and anticipate problems that arise in fish farming.

3.2 The Influence of Striped Snakehead Fish Farming on Social Effects

The social effects were taken from data interviews with the use of labor as following table:

| No. | Respondent | Use of Labor |
|-----|------------|-------------|
| 1   | Ambri      | 1           |
| 2   | Pidi       | 1           |
| 3   | Ahmad Kusasi | 1          |
| 4   | Abdu Samad | 1           |
| 5   | Kaspul Anwar | 1          |
| 6   | M. Arifin  | 1           |
| 7   | Lasa       | 1           |
| 8   | Sarman     | 1           |
| 9   | Ipin       | 1           |
| 10  | Abd. Rahman | 1          |
| 11  | Samsuri    | 1           |
| 12  | Raslan     | 2           |
| 13  | Jadri      | 1           |
| 14  | Rusdi      | 1           |
| 15  | Abdul Azis | 1           |
| 16  | Jakfar     | 1           |
| 17  | Nayan      | 1           |
| 18  | Ruslan A   | 2           |
| 19  | Ruslan     | 3           |
| 20  | Darkani    | 1           |

Source: Results of Primary Data Processing (2019)

3.3 The Influence of Striped Snakehead Fish Farming on Economic Effects

The economic effects were taken form data as following tables. The analysis of the profitability of the business of enlarging embedded net cage can be calculated by several components as follows:

| No. | Type of Cost | Average Cost (IDR/ person / year) | Percentage (100%) |
|-----|--------------|-----------------------------------|-------------------|
| 1   | Fixed Cost   | 852,066.67                        | 65.60             |

From the social aspect, this business influenced the use of labor in its business, both in the form of its own labors and family member labors. The use of labors started from the preparation, maintenance and harvest stages.
Table 5: Profit and Payback Period of Fish Farmers

| No. | Components          | Value (IDR/Fish Farmer) |
|-----|---------------------|-------------------------|
| 1.  | Income              | 4,162,500.00            |
| 2.  | Costs               | 1,608,265.48            |
| 3.  | Profit per Year     | 2,554,234.52            |
| 4.  | Payback Period      | 2.23                    |

Source: Results of Primary Data Processing (2019)

Table 6: Measurement Results of In Situ Water Quality in Maintenance Media

| No | Location | pH | Temperature (ºC) | DO (mg/l) |
|----|----------|----|-----------------|-----------|
| 1  | RT.01    | 6.7| 28.4            | 21.06     |
| 2  | RT.02    | 6.71| 28.9            | 3.95      |
| 3  | RT.03    | 6.8| 28.0            | 4.51      |

Average: pH 6.75, Temperature 28.43ºC, DO 4.17 mg/l

Source: Results of Primary Data Processing (2019)

Table 4:

| No | Location | Variance in Water Quality |
|----|----------|----------------------------|
|    |          | Variable Cost | Fixed Cost | Total Cost |
| 1  | RT.01    | 389,300.00    | 34.40      | 1,298,841.67 |

Source: Results of Primary Data Processing (2019)

The average farmers' profits can be seen in the table as follows:

The benefits obtained by farmers varied between 627,433.33 IDR to 9,789,533.33 IDR per cultivating period, the farmers who have a payback period of under 1 year, whereas from the aspect of the business environment this did not have a harmful and polluting effect on the environment, because all inputs did not use hazardous materials and the products are fish that are safe for public consumption. This business utilized fish stomach waste which was used as alternative feed so that it was no longer wasteful but could also reduce production costs.

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IV. CONCLUSION

Based on the results of the research, conclusions can be taken as follows:

1. Based on the results of the profit analysis, the striped snakehead fish farming proved to be profitable. The benefits obtained by farmers varied between 627,433.33 IDR to 9,789,533.33 IDR per cultivating season, compared to the South Kalimantan Regional Minimum Wage 7 people were above the South Kalimantan Minimum Wage of 2,651,781.95 IDR, while 13 people were still below the Provincial Minimum Wage. While the results of the calculation of Payback Period (PP) of 2.23 indicated that to be able to return the cost of investment mode this business must run at least 2.23 years.

2. The striped snakehead fish farming in stepped net cages influenced the socially, economically, and from environmental aspects in the form of water quality of save the striped snakehead the maintenance media is

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still within the tolerance limit of Class 3 Water Quality Classification for fishery, agriculture and livestock activities.

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