Public perception of catfish aquaculture ponds in Banjar District, South Kalimantan, Indonesia

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Abstract. This study aims to analyze the public perception on catfish pond aquaculture in Banjar District, South Kalimantan, Indonesia. The study was conducted from May 2017 to July 2018. Data collected from questionnaires were ordinal data measuring response levels using the Likert scale. Data was collected in the form of: data on aquaculture businesses, and data on public perception of catfish culture in the environment, perceptions of waste from aquaculture, perceptions of water management, and their effects on human welfare. The results showed that the perception of the community of the catfish culture business is mainly positive, because it is beneficial to the community.
Key Words: Banjar, catfish, fish farming ponds, human welfare.

Introduction. Aquaculture has been long developing in the general public, both as a main livelihood or a side income source. The number of ponds owned by farmers varies from large to small businesses, depending on the capital owned by the cultivator, the species of farmed fish, and other factors. Most fish farmed for aquaculture in South Kalimantan, Indonesia, are catfish, goldfish and tilapia (Department of Fisheries and Marine Affairs 2015). The developing of freshwater fish farming businesses in Banjar Regency, Indonesia, will affect the community involved in aquaculture, but not only, leading to diverse perceptions in the community. Radiah et al (2012) state that a perception is a person's understanding of an object, giving certain reactions, resulting from the ability to organize observations and arriving to acceptance or rejection. Perception will foster motivation and fantasy from the stimulus received. Some community-based management strategies in implementing community-based resource management need to first pay attention to the community's knowledge and perceptions about the natural resource itself and the problems that exist (Nurliadi 2018). Community life will not be separated from the perception of the community itself, including the development of catfish aquaculture business, which is highly dependent on the participation of surrounding communities.

The aquaculture community has businesses of various scales. The scale of fish farming can be seen from the size of land owned by fish farmers. Based on data from the Fisheries and Marine Agency of Banjar Regency (2015), there are 671 fish cultivators in Banjar Regency, divided into small, micro and medium scale categories (Table 1).

Table 1

Number of pond aquaculture households by category of business size in Banjar District, Indonesia

District	*Total*	*Number of businesses(categories based on land area)*			
		<0.1 ha	*0.1-0.3 ha*	*0.3-0.5 ha*	*>0.5 ha*
Banjar	671	73	406	99	93

Note: source: Fisheries and Marine Agency of Banjar Regency (2015).

The results of previous studies show that fish farming in ponds in Banjar Regency can be divided on the business scale into 3 categories, based on profit: large business scale, small business scale, medium business scale (Febrianty et al 2018). The determination of the business scale is based on the area of land owned (Decision of the Minister of Maritime Affairs and Fisheries No. 13/2008; Decision of the Minister of Maritime Affairs and Fisheries No. 05/2009). The extent of land used for catfish ponds will affect the surrounding community, especially the community's perception of businesses that affect community welfare and the environment.

Impacts that can arise in the community can come from waste from fish farming businesses such as pond water discharged into the environment and a large number of migrant workers. This has the potential to cause conflict in the community. Therefore, it is necessary to know and understand the community's perception of pond fish farming in their proximity. This research aims to determine the perception of the surrounding community on the existence of catfish ponds in Banjar Regency, Indonesia.

Material and Method. The study was conducted from May 2017 to July 2018, on the Districts of Martapura City and West Martapura, in the Regency of Banjar, Indonesia, with the consideration that the area was a center for catfish (*Pangasius* sp.) culture with 90 cultivators consisting of various business scales (data from the initial survey research).

The sample selection consisted on purposive sampling, the observed respondents being adult residents living around the study site, directly affected by catfish cultivation. The respondents numbered 65 people consisting of 5 community leaders, 5 policy makers, 25 cultivators and 30 people from the general public.

The public perception examined included aspects of management of catfish aquaculture in ponds, catfish farming waste, the influence of catfish culture on community welfare and overall catfish cultivation business. These aspects describe the socio-economic situation for the community.

Questionnaires were used in this study to explore public perception of catfish culture aquaculture ponds, the following aspects being determined:

1. Respondent perception of catfish culture in their environment, with 2 aspects: respondent approval of catfish culture in ponds, and benefits of catfish culture in ponds.

2. Respondent perceptions of management for fish farming, with 2 aspects: if the managing of pool water does not disturb the environment, and if the discharge of wastewater does not cause flooding in the surrounding environment.

3. Respondent perception of waste from fish farming, with 3 aspects: if catfish farming waste does not pollute the environment, if catfish farming waste must be deposited first in the settling pond, and if waste of catfish cultivation pollutes the environment.

4. Respondent perception of the influence of catfish culture on the welfare of surrounding communities, with 4 aspects: if cultivation of catfish increases the welfare of the surrounding community; if catfish culture is beneficial for the surrounding community; if cultivation of catfish increases employment for the surrounding community; and if cultivation of catfish increases income for the surrounding community.

Data on community perception on the aspects above was analyzed on the Likert scale, by multiplying the results of respondent scores on the scale table. Thus, the total score obtained on each aspect/item was analyzed in order to obtain conclusions of community perception. Data analysis using a Likert scale measures a person's agreement or disagreement with an object (Sugiyono 2014). Table 2 shows the utilized scores.

Table 2

Scores of community perception/attitude assessment

Score	*Perception/Attitude*
1	Strongly disagree
2	Disagree
3	Doubtful
4	Agree
5	Strongly agree

Results and Discussion

Perception/attitude towards catfish culture in ponds in the community. Perceptions/attitudes towards catfish culture in ponds for all business scales show that 54% of respondents strongly agree with the existence of catfish farming in ponds and 46% agree with the existence of these aquaculture businesses in their proximity. Overall, perceptions of catfish farming businesses in ponds have a high score, meaning that the community accepts and agrees with the existence of catfish farming in ponds in its proximity.

Public perception of the management of catfish aquaculture in ponds. Water management determines the success of fish farming, especially fish farming in ponds. This is because efforts are needed to replace pond water, so that the water quality is maintained. Pond water management is carried out by catfish cultivators, by utilizing different water sources for water replacement. The public perception of the management of pond water had a high score, which means that the community strongly agrees with the way the water management is carried out by catfish farmers.

49% of respondents strongly agree that water management does not disturb the environment and does not cause flooding, because most of the farmers discharge water into the drainage ditches located on their land. 6% of respondents strongly disagree. This is because the drainage ditch cannot accommodate the water, so that water overflows onto roads used by the community. This occurs especially in the case of medium-scale fish farming businesses. The scale of the business determines the amount of water used in aquaculture with ponds.

Public perception on catfish farming waste. Based on research by Froehlich et al (2017), a better communication and investigation of the actual impacts of perceived cultivation can help clarify the debate about aquaculture, and help support the growth of sustainable fish farming in the future. Communication and investigation regarding public perception of fish pond waste can support the sustainability of catfish culture. Waste from catfish culture in Banjar Regency, is discharged with drainage water into the Martapura River through various ditches. Research by Putri et al (2014) shows the quality of water has to suffer due to fish farming in Banyuasin Regency.

The results of this study indicate that public perception about catfish culture waste in ponds in Banjar District has a moderate score, which shows that the community feels that they were not strongly affected by catfish culture waste. Only 3% are hesitant about fish farming wastes, saying that farm water occasionally discharges onto the roads, because the drainage ditches are sometimes unable to collect water from the ponds.

54% of respondents think that they strongly disagree that waste from catfish culture is polluting the environment, because the impact felt by the community is very small (only 3% strongly agree that the waste pollutes). 18% of respondents strongly agree that waste from fish farming must be treated before disposal. The treatment method consists in depositing the waste in a settling pond. Thus, before being discharged into the environment, the quality of the water is somewhat better.

The public perception in Banjar Regency is not different from the results of Sofia's research (2017), where the perception of fishermen around the Batungap swamp area on

the aquatic environmental management is good, 80.9% of respondents agreeing about the benefits and realizing that fish catches are very dependent on the good conditions of the aquatic ecosystems.

6% of respondents disagreed that catfish pond waste should be deposited first in the sedimentation pond, because the community knows that most fish farmers have made sewerage ditches, so that aquaculture wastewater settles first in the drainage ditch before being dumped in the river. However, Cao et al (2007) state that waste without proper management can result in a high increase of total organic matter and cause high economic and ecological losses.

Public perception of the influence for catfish culture on community welfare. The influence of catfish culture on improving the welfare of the community consists in the existence of benefits for the surrounding community, increasing employment and increasing income of the community around the fish farming businesses. Public perception about the influence of catfish culture on community welfare had a high score, the community strongly agreeing that catfish culture efforts improve community welfare.

46% of respondents strongly agreed that catfish culture efforts improve welfare for the community. This is because, with the development of catfish culture, the community's economy has been increased as a result of the multiplier effect, with growth of new businesses related to catfish culture, like production and sale of feed, sale of seeds, catfish marketing and food stalls. These results are in line with the results of Richardson & Suvedi (2018), who state that aquaculture technology has the potential to contribute to food security, household income and conservation of wild fisheries.

Cultivating catfish is beneficial for the surrounding community, as can be seen from the opinion of 46% of respondents, who strongly agree with this statement. The perceived benefits include the availability of infrastructure such as roads with good conditions, catfish culture, minapolitan (aquaculture) areas, easy transportation and communication access, cooperative institutions and others. However, there were still respondents who answered doubtfully (3%), because they did not benefit directly from the catfish farming businesses.

Catfish culture increases employment for the community, according to the opinion of 49% of respondents, who strongly agreed with this statement. This can be seen from the many people who work when the fish harvest takes place, and in other aquaculture related activities. Generally, for one harvest, 5 to 9 workers are required. Catfish harvesting is carried out in rotation in each pond, so that the absorption of local labor to help harvest is continuous. The highest labor absorption is by the large businesses, with an average of 4 people hired for daily maintenance of the ponds, and another 8-9 people hired for harvests. Medium and small businesses require 1-3 permanent workers and 5-7 harvest workers. However, because the number of medium and small businesses in aquaculture have a higher number than large businesses, there is also a large absorption of labor by these smaller businesses. Mondal et al (2012) stated that a higher economy (1409.64 USD per ha per year) and social benefits are accruing to the community from fish and agriculture through human resource development.

48% of respondents strongly agreed that community income increased due to direct income at the time of the fish harvest. Wages were given to harvest workers (0.02 USD per kg of fish), so that in one harvest they could get a large wage (between 21.4-71.33 USD per person per harvest). The wage for permanent labor was between 107-142.67 USD per month. Richardson & Suvedi (2018) stated that most farmers continue to practice small-scale cultivation as a mean to increase the household income and food availability in Cambodia.

Public perceptions about the overall catfish cultivation businesses. Communities agree with the presence of catfish culture businesses in their proximity, because it benefits the community, there is no visible waste effect on the community, and it improves the welfare of the community through absorption of local labor and new ventures. According to Goswami & Sathiadhas (2000), community-based fish farming activities are economically feasible in several parts of other countries as well (India).

Wandji et al (2012) show that the strong commercial orientation, coupled with positive perceptions about aquaculture benefits, frequent contact, extension and education level are the main determinants for fish farming adoption in the western highlands of Cameroon. The results of Suparti (2004) argue that community participation is needed as part of resource management starting from the stages of planning, resource utilization, resource maintenance, and evaluation of resource management. Thus, a sense of responsibility and a sense of belonging to the surrounding environment will arise.

Conclusions. The perception of the community of Banjar District, South Kalimantan, Indonesia, agreed with the proximity of catfish culture businesses, because it is beneficial to the community. Moreover, little visible waste effect is perceived, and it improves the welfare of the community through labor absorption and new and emerging businesses.

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