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Community Perceptions of Aquaculture Development in Cemara Labat Village, Kapuas of Central Kalimantan

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ABSTRACT

Government of Kapuas Regency has developed aquaculture as the livelihood alternative for coastal society in Cemara Labat Village which had household background with variety of livelihoods. This region attracts some attentions because Cemara Labat Village has not known the aquaculture as one of incomes sources. During this time, the activity was fishing and seasonal agriculture. More integrated approach for aquaculture developing will give the impact of economical benefit and work chance for local and regional economic growth. The objective of this study was to investigate how far the coastal society perception of Kapuas to aquaculture development which was carried out for supporting sustainability of aquaculture as the alternative of livelihood. In depth analysis, this study intended to help government in developing the policy and program which was responsively to some interests and to increase the process of participation, consultation, and communication among the interest holders. Standard interview and questionnaire were used for data collecting by using Participatory Rural Appraisals and then the questionnaires were analyzed with Liker method. Practice of aquaculture has been carried out as the alternative for increasing fishery products. Result showed that experience and knowledge of aquaculture is still necessary to be significantly increased. Decision maker and interest holder are more necessary to understand the implementation process of aquaculture knowledge so that the ceminated and adopted process are more effective. It is due to the society interest for managing aquaculture is still high and it can socially be accepted although the access to technology is still difficult and infrastructure condition has not been satisfied. The better market access is still very important for small scale of producer in study location. Government has to promote the integration of small scale aquaculture into global market economy, to increase competitive power by facilitating the cooperation among sectors, to make collaboration and experience sharing, to facilitate the preparation, certification, and marketting.
KEYWORDS: perception, aquaculture development, Central Kalimantan.

INTRODUCTION

Coastal region of Central Kalimantan has the length of ± 750 km with brackish water aquaculture area number of 96,316 ha. The usage of aquaculture potency has still reached 4,500 ha so that the potency is felt having not optimally managed and the development chance of brackish water aquaculture is still very large [1]. In 2001, coastal region of Central Kalimantan has been as part of resource management national plan on integrated marine and coastal through Marine and Coastal Resources Management Project (MCRMP) [2]. However, MCRMP programs have not been expanded with the management of capturing and aquaculture. Since 2007, Kapuas Regency Government began to develop aquaculture as the livelihood alternative for Kapuas shore society which was started with aquaculture sample in 1999 [3]. The effective and sustainable management of marine and coastal resources needed active society participation and holistic government policy [4]. Coastal region as the sustainable aquaculture development centre has to be based with right, enclosed, and integrated plan with the other sectoral plan [5].

Perception and hope are the integrated factors that influence society in making decision [6]. As the important part of aquaculture management and plan, perception and behaviour of society has been more ignored [7]. Some researchers have investigated the relation between perception and behaviour in the field of aquaculture policy. Tango-Lowy and Roberson [8] have observed the fishermen in North New England. They found that fishermen behaviour to the innovation, fishery characteristic, and communication behaviour influenced their availability to adopt the technology of aquaculture [7]. They have interviewed 66 aquaculture experts and have surveyed to 600 households for knowing that society supported the benefit of fishery

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economic social, but the society have been worry about the environmental impact of aquaculture. Sanchez and Muir [4] have investigated the fishermen perception in Mexico Bay and they presented that aquaculture was suitable as the capturing activity alternative. Jingjie [9] has studied about the difference between perception and behaviour function in determining the development option of aquaculture in USA and Norwegian. However, no study has been planned to understand the perception and behaviour function in determining the choice related with aquaculture development for society which have more than one source of livelihood that their livelihood activities were influenced by climate and season. Livelihood is as the understanding of ability, asset, and activity which are needed for life facility [10].

Study about the society perception in Kapuas Regency Coast to aquaculture development was necessary to be carried out for supporting aquaculture sustainability as the livelihood alternative that intended to help government in developing the policy and program which were responsive to some interests and increased the process of participation, consultation, and communication among the interest holders.

MATERIALS AND METHODS

Study area

This study conducted during eleven months. The location of study was in Cemara Labat Village, Kapuas Kuala District, Kapuas Regency of Central Kalimantan as in Figure 1. Geographically, Cemara Labat Village was located in the east longitude of 114º 14'58, 33" - 114º 18'32, 73" and south longitude of 3º 21'14, 20" - 3º 26'41, 67". This village is one of five coastal villages in Kapuas Regency of Central Kalimantan Province. Cemara Labat Village has coastal line from east to west of ± 8 km with area number of ± 52 km^2 [11].

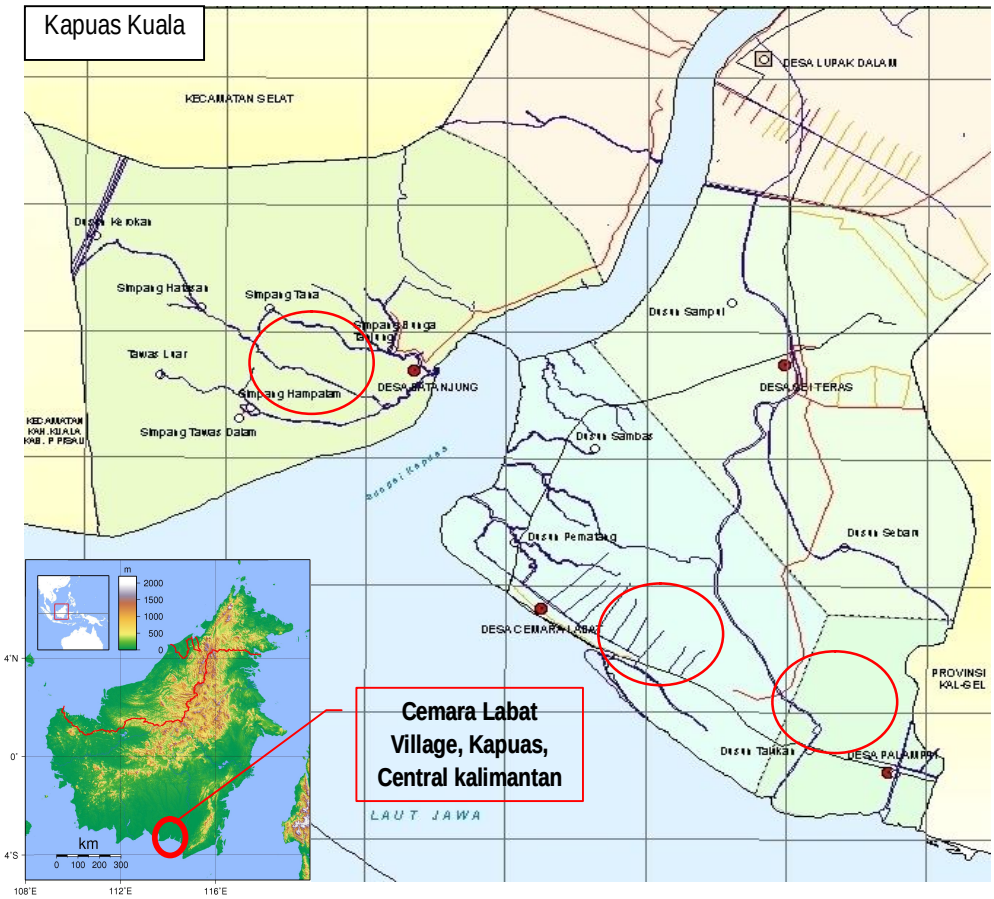


Figure 1 Map of Cemara Labat Village, Kapuas of Central Kalimantan

Kapuas Regency Government is motored by Department of Marine and Fishery beginning to introduce aquaculture in 1999 through sample aquaculture. In 2001, aquaculture business began developing in Cemara Labat Village. In 2007, Department of Marine and Fishery was return to develop sample aquaculture in Labak Cemara with involving the society with area number of ± 20 ha. In 2009, there was developed aquaculture with area number of 1,000 ha in 3 coastal villages such as Cemara Labat Village (± 200 ha), Batanjung Village (±

200 ha), and Palampai Village (± 300 ha). By being the fishery channel until now, the society traditional aquacultures with the commodities of shrimps and Milk Fishes have been developed [3].

The harvest of aquaculture was carried out once a year by applying traditional technology and there were failure of more harvest cases. Milk Fish Seed (*nener*) was still imported from region outside (Java Island), so it influenced disease holding because of difficult distance and transportation. Aquacultures were also depended on natural seeds. The selection of seed larva was difficult to be carried out so the developed commodity was still depended on surrounded nature. Most of aquacultures have not used industrial weft as well as personal making weft. Plantation that was carried out was still depended on natural weft.

Sampling design

Approach of standard interview modification with questionnaire was used to get information about the perception of aquaculture development in coastal region of Kuala Kapuas [12]. The interview intended to identify the issues of aquaculture, livelihood, and social related to the production activity of fishery and aquaculture technology. This approach involved 104 respondents which came from Cemara Labat Village of Kapuas Kuala District] [13].

Data collection and analysis

To evaluate the questionnaire in order to be suitable with the local society expression, process of data collecting was carried out with Participatory Rural Appraisals [14]. Questionnaire measuring used Likert method [15], and then the response was evaluated by using Chi Square and Kendall's W Concordance Coefficient for measuring the difference between variable rank and the agreement among the difference groups [16]. Focus of discussion group was used as the triangulation method for avoiding bias in interview process [17].

RESULTS AND DISCUSSION

Characteristics of respondents

The youngest respondent was 21 years old and the oldest one was 67 years old with the average age of respondents was 4-.5 years old, and 08% of respondents were under 50 years old. Most of respondents' education level was elementary graduation and 15% of them were not graduated from elementary school, but junior school graduates were 8%.

Distribution of respondents based on household the major income of agricultural activities was 51%, then fishing or fisherman was 34%, and aquaculture was 15% as presented in Table 1. Almost all of the respondents had some livelihood sources with some natural resource base combinations such as fishing, agriculture or plantation, and aquaculture. Activity pattern was carried out by fitting to climate and season. Generally, seasonal cycles of agricultural farming were presented as in Table 2.

Table 1 Distribution of the respondent households according to their main occupation or source of income

Main sources of income	Proportional distribution of respondent households	Combination of major livelihood activities
Fishermen	35	Farmer; Aquaculturist; Business
Aquaculturist	16	Farmer; Village official
Farmers	53	Fisher; Business; Aqua culturist

Source: structural interview of 104 household respondents in Cemara Labat Village from December 2011 until January 2012

Table 2 Activity cyclist of agricultural farming in Cemara Labat Village of Kapuas Kuala.District

No.	Activity	Month
1.	Fishing	May – October
2.	Agriculture-Rice	Juny – November
3.	Agriculture-Crops	December – March
4.	Aquaculture	July – February

Source: interview with society head and head of Cemara Labat Village from December 2011 to January 2012.

Area number and usage for agricultural activity in Cemara Labat Village included 1,063.5 ha of irrigated rice area. 251 ha of dry field, 220.4 ha of aquaculture, and the other was shrubs and forest [18].

Knowledge and experience of aquaculture

Households in Cemara Labat Village which were targeted as the respondents for evaluating the knowledge and experience about aquaculture were 35% of respondents had ever managed aquaculture and now there were left 17%. The interest of managing aquaculture was still high (80%) and the knowledge background about information of aquaculture development program from government was 78%, although about 37% of

them have followed the socialization of aquaculture development program and 29% of them have ever followed training about aquaculture management as described in Table 3.

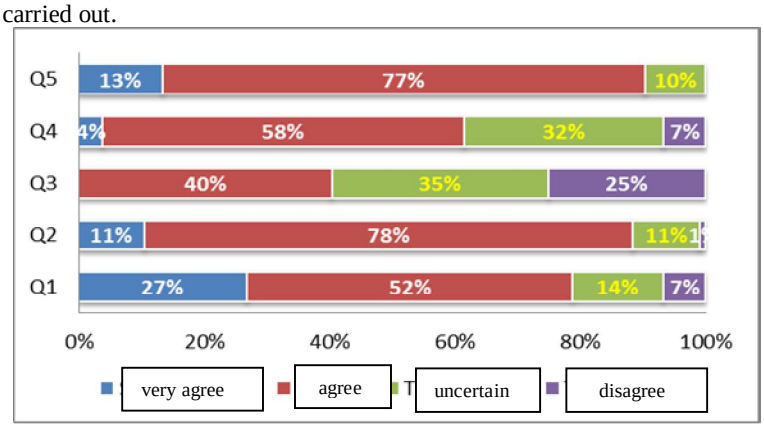
Table 3 Percentage of response about experience and knowledge of aquaculture management

No.	Topic of question	Response (%)	
		Yes	No
1.	Having ever managed aquaculture	35%	65%
2.	Managing aquaculture now	17%	83%
3.	Having interest to manage aquaculture	89%	11%
4.	Having ever followed the training of aquaculture managing	29%	71%
5.	Knowing aquaculture development program from government	78%	22%
6.	Having ever followed the socialization about aquaculture development	37%	63%

Source: Primary data (2012), n =104,

Perception on Aquaculture

The availability of varied economic chance where there was limited production and climate or seasonal influence affected personal way of considering and adopting of some alternative of economic chance. In facing the economic chance, regional development, and resources conflict, it showed that 11% of respondents were very agree and 78% were agree about aquaculture might still be as livelihood alternative for producing income increasing. There were 52% of respondents were agree and 27% were very agree to find the other alternative which being carried out now. This illustrated that the activity which was carried out during the time has not still satisfied. By the correlation of Kendall's: W=0.058; $\chi 2$ hit =29.98; $\chi 2$ Tab=9.49; and P(0,05) as presented in Figure 2. The major attention that was expressed by the respondents was the harmless due to the aquaculture experience being ever carried out.



Note: Q1= There needed the other alternative activity except the activity now
Q2= Aquaculture as the livelihood alternative
Q3= Fishing can be integrated with aquaculture activity
Q4= Agricultural farming of plantation can be integrated with aquaculture activity
Q5= Aquaculture can be integrated with mangrove conservation

N= 104 *W*= 0,058, $\chi 2$ hit =29, 98 $\chi 2$ Tab=9,49 P(0,05)

Figure 2 Society perceptions to aquaculture

The major livelihood that was carried out during the time was assumed being not fulfilled household demand so the majority respondents (78%) agreed that it needed activity diversification and aquaculture was assumed strong as livelihood source and employer creating in study location because 90% of respondents assumed that in long term, work chance has possibility being obtained from aquaculture. All of communities were interesting with the activity diversification of fishing and aquaculture sector that were assumed as the alternative for practicing product now as presented in Figure 3.

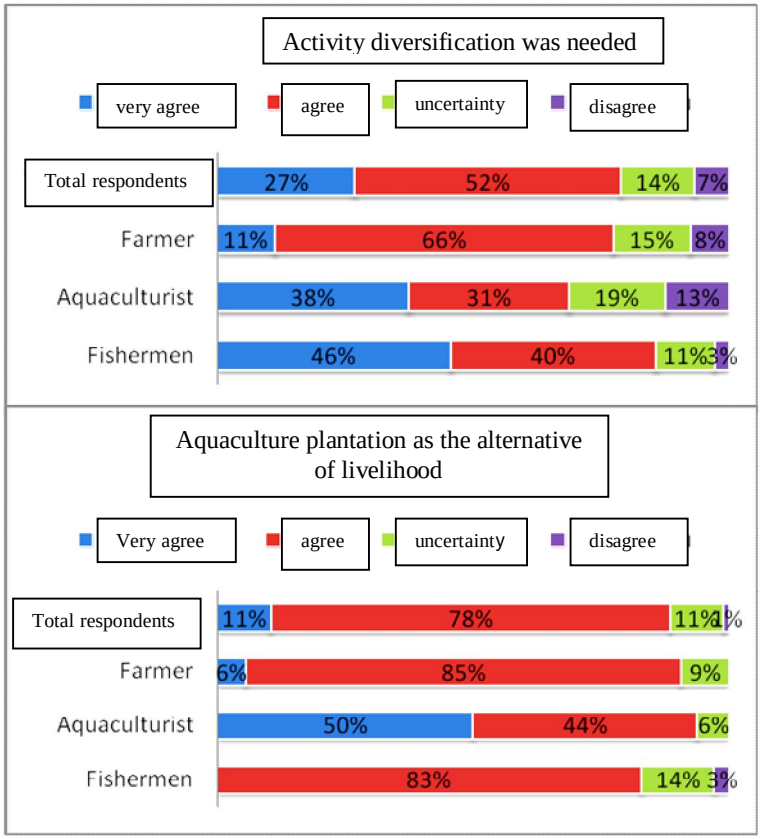


Figure 3 being necessary the activity diversification and aquaculture as the alternative

Aquaculture group expressed that aquaculture very enabled to be integrated with the other activity such as fishing as well as agricultural plantation. The different thing was presented by part of fishermen group (37%) which expressed that to integrate aquaculture with the other activity had not certain been carried out as well as being expressed by the other part of farmers (38%). It was possible because the respondents expressed that aquaculture had not certain Benn integrated with the other activity because there has never tried to carry out aquaculture practicing with the correlation of Kendall's*:* W=0'095; $\chi 2$ hit =9'95, $\chi 2$ Tab=3.84; and P(0.05) as presented in Figure 4.

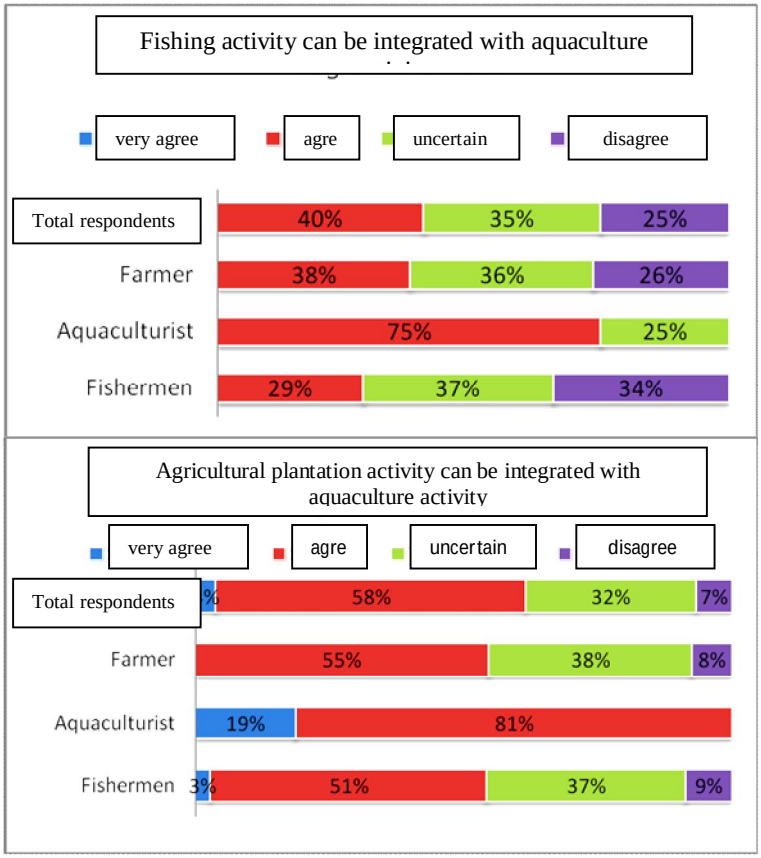


Figure 4 integrating some livelihood resources with aquaculture

Aquaculture group has carried out aquaculture practicing and felt the mangrove benefit in process of aquaculture activity with traditional technology. Aquaculture dependence to mangrove was still high because plantation practicing that was carried out still depended on natural weft. Meanwhile, fishing group expressed that when the mangrove was good, fishes in aquaculture would well grow. In addition, there was often socialized about mangrove conservation that was carried out by local government. There were 77% of respondents were agree that aquaculture could be integrated with mangrove conservation with the value of $\chi 2$ = 89.194; df = 2, and P=0.017. This might be one of socialization impacts that had been carried out by regional government and the positive value of Marine and Coastal Resources Management Program that occurred during 2001 until 2008 as presented in Figure 5.

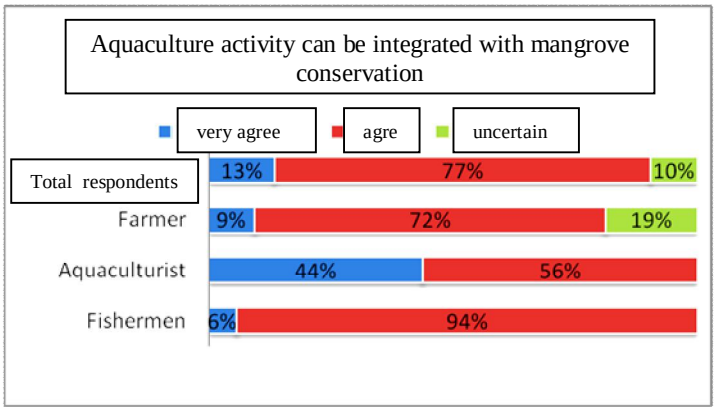


Figure 5 Aquaculture can be integrated with mangrove conservation

Perception to market opportunities

In the study location, marketing of fishery product was relatively easy although transportation still depended on river. Based on the expression of respondents, marketing of fishery product during the time was to Kapuas as well as to Banjarmasin. There was 63% of respondents presented that marketing of aquaculture product was profitable and only 19% said that it was uncertain as described in Figure 6. In this case, uncertain meaned sometimes giving profit and sometimes was harm. Aquaculture respondents were as the actors which practiced the marketing process of aquaculture product. In addition, 100 % of respondents of fishermen group expressed that marketing of aquaculture product was easy but it was not certainly profitable. Based on the expression of fishermen, it was seem that experience in carrying out marketing practice of fishery product very influenced their perception. During the time, fishermen in marketing of fishery product was still controlled by buyer up (collector trader) so the certainty of price became as an uncertainty hope. However, the expression of farmers were almost suitable with fishermen such as 89% of farmers group respondents expressed that marketing of aquaculture product was uncertain and even only 45% of them presented that marketing of plantation product was easy with the correlation of Kendall's: W=0.147; $\chi 2$ hit =15.26; $\chi 2$ Tab=3.84; and P(0.05).

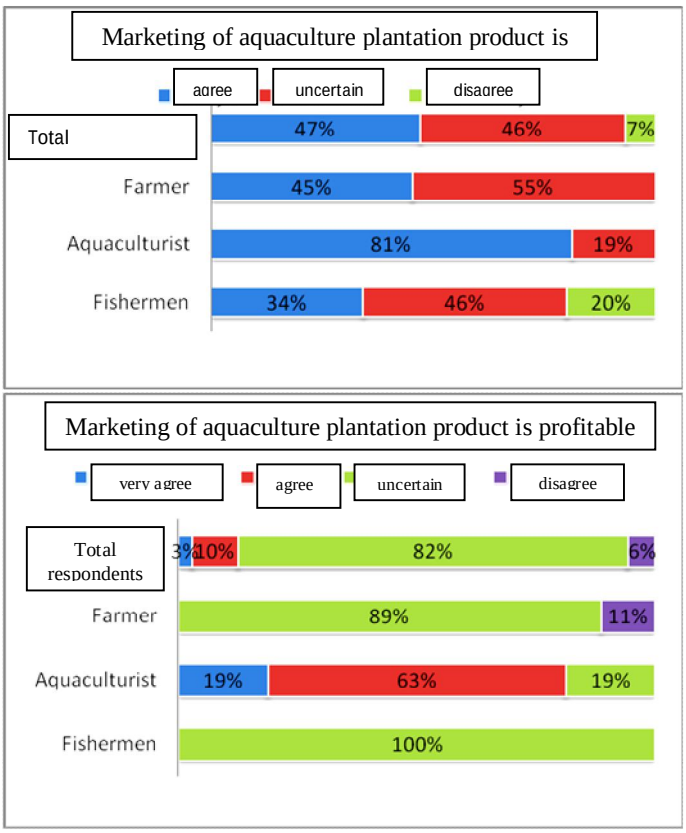
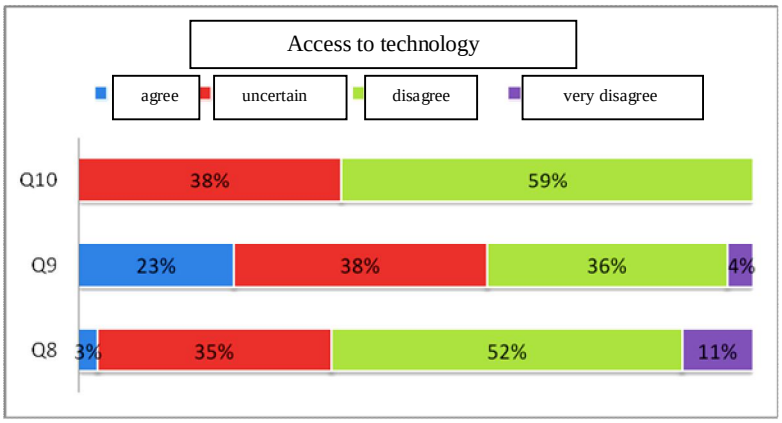


Figure 6 Community perceptions to market chance of aquaculture product

Access to technology

In the case of access to technology, most of respondents gave negative response. They assumed that technical help related to aquaculture during the time was not satisfied. Respondents that had aquaculture experience also assumed that technical help that was carried out by government during the time was still less. Most of respondents (36%) assumed that plantation technology that was applied during the time had not been suitable as presented in Figure 7. The reason was the available plantation that was applied during the time was not given the imitation welt and the seed did not come from hatchery so it would not increase the aquaculture product with the correlation of Kendall's: W=0.0774; $\chi 2$ hit =16.1; and $\chi 2$ Tab=8.9 P(0.05)



Note: Q8= Technical help of available aquaculture which has been satisfied
Q9= Aquaculture technology which has been suitable
Q10= Available plantation technology could increase aquaculture product

Figure 7 Response to aquaculture technology access

Infrastructure

The condition of land road that related between Kuala Kapuas and coastal villages included Cemara Labat did not still fit. Electrical facility in coastal region was generally belonged to the little part of population with electrical source as generator and solar cell. By the condition, most of respondents (88%) hoped there was available land road network as described in Figure 8 with the correlation of Kendall's: W=0.0840; $\chi 2$ hit =26.2; and $\chi 2$ Tab=9.49 P(0.05)

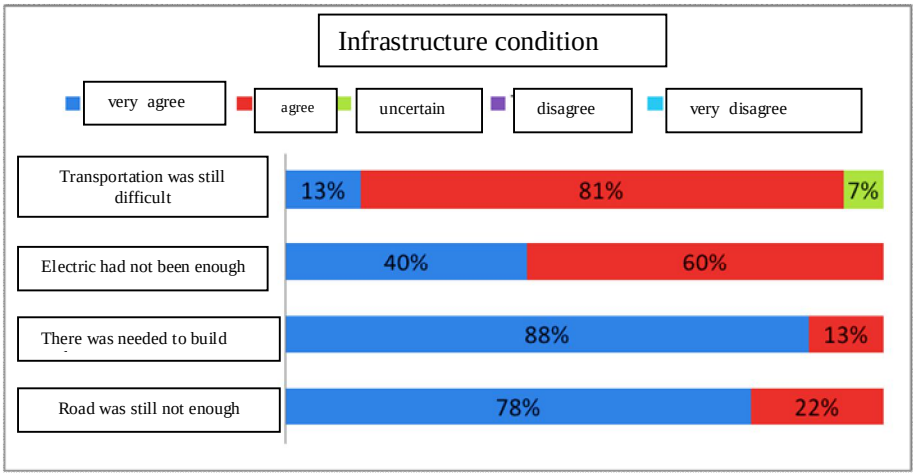


Figure 8 Response to infrastructure condition

Attitudes to participation in Coastal Resources Management

Response of respondents were positive to being important of collective participation in managing coastal resources such as 70% of respondents were very agree with needed collective participation and 30% were agree it as presented in Figure 9 with the correlation of Kendall's W=0.610; $\chi 2$ hit =127.0; and $\chi 2$ Tab=8.99 P(0.05)

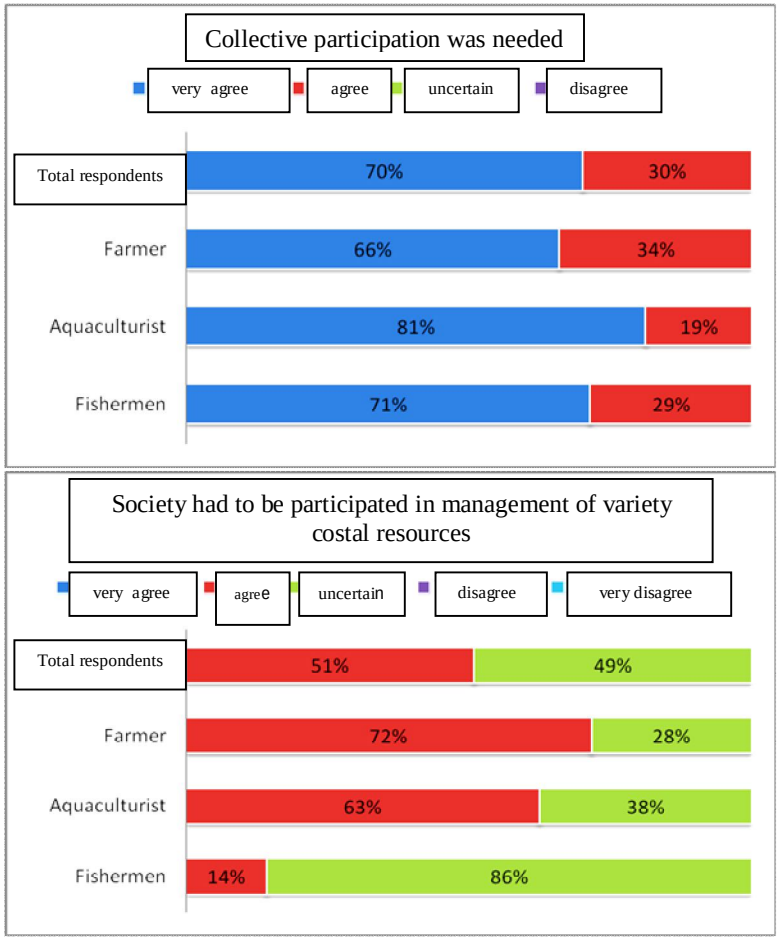


Figure 9 Response to collective participation

Attitudes to government support

There were 63% of aquaculture respondents agreed that government involving in helping aquaculture development was satisfied enough as described in Figure 10. However, most of fishermen and farmers respondents group expressed the unsatisfied responses. Although aquaculture development in Cemara Labat was as government intervention in supporting the increasing of fishery product but government involving was still felt by part of society with the value of $\chi 2 = 37.98$; df = 2, and P=0.001)

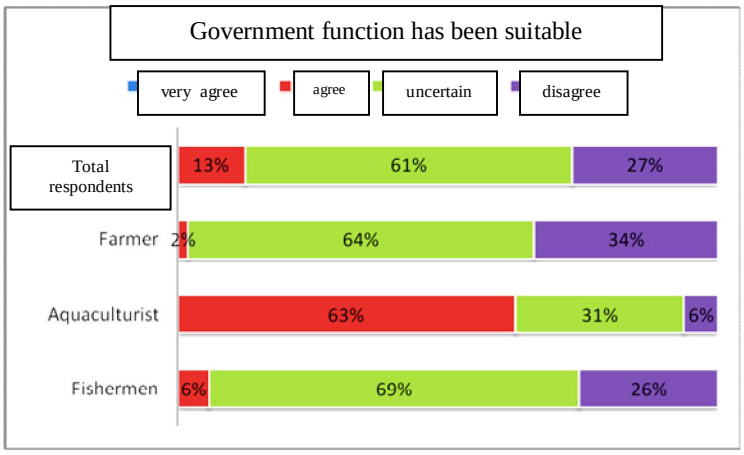


Figure 10 Response to government function

Marine and coastal Resources management Program (MCRMP) has been carried out since 2001 until 2008 in coastal region of Kuala Kapuas then it was continued with the implementation of management plan by

government of Kapuas Regency. The aim of Kapuas coastal and marine management were as follow: 1) to develop integration among government official, businessman, and society in coastal region management; 2) to form agreement in giving systematically development proposal agreement; 3) to identify the process for monitoring, evaluating, and improving integrated coastal management plan; 4) to coordinate with the other initiative plan. However, the objectives of management plan were as follow: 1) Optimization of coastal and marine usage, regulation, and monitoring; 2) Institution capacity increasing of coastal and marine resources management; 3) Suitability and increasing of cooperation among departments in coastal and marine resources management; 4) Inventory, development, and empowerment of human resources [19].

One of the management plans implementation was aquaculture development. The policy that was applied in 1999 was to develop simple aquaculture without involving the society and in 2007 there was developed simple aquaculture with society involving in Cemara Labat in aquaculture region of ± 20 ha area number. Aquaculture was carried out once a harvest year with traditionally technology application and there were some cases of harvest failure. Seed of Milk Fish (*nener*) was still imported from outside region (Java Island) so that influenced disease holding. Farmer also still depended on natural seed. The selection of seed larva was difficult to be carried out so developed commodity still depended on surrounded nature. Most of farmers have not use industrial weft as well as personal making weft. Plantation that was carried out still depended on natural weft.

The formal education average of aquaculture farmers were graduated and not graduated from elementary school with technical knowledge background about aquaculture management was still very minimal. Therefore, respondent hope of technical help was very necessary, while training process was not sustainable carried out. Some cases which were less attended was society livelihood base which during the time it was based on fishing and plantation, so mechanism understanding responded to the variability change of livelihood resource was necessary to be carried out by regency government included to inform adaptation strategy that was planned with multi-sectors perspective [20].

Experience and knowledge about aquaculture of Cemara Labat village society was still necessary to be significantly increased. Although the society interest for managing aquaculture was still high, based on the evaluation of knowledge and experience showed that ± 50% of respondents which had ever managed aquaculture before that was facilitated by government, has stopped. The reason was they have not commonly managed aquaculture and it was difficult asking to fishery instructor when there was problem in plantation process being carried out. To solve this problem, it was necessary to be carried out the education and training for interest holder included the instructor and aqua culturist [21]. Knowledge was an important aspect in aquaculture development about knowledge of innovation as well as new challenge. Policy maker of plantation and interest holders were necessary to more understand the implementation process of plantation knowledge so that dissemination and adoption process was more effective [22]. Education and training was not only as the technical problem of aquaculture management but it was also as the strategy to face the climate and seasonal change pattern so the impact of climate change to livelihood like identified by Badjeck *et.al*. [20] and described by Swaminathan [23] could be anticipated.

According to the result of perception evaluation to aquaculture, it showed that aquaculture socially could be accepted by the society of Cemara Labat Village. Phenomenon of fishing product marketing in Kuala Kapuas was necessary to be carried out in depth analysis mainly which related to who controlled market and what fishermen hope to the buyer up. It was important to firm back that better market access was still very necessary for producer in small scale and for general village development [24]. Government had to promote the aquaculture integration in small scale into global market economy, to increase competitive power by facilitating cooperation among sector, collaboration, and experience sharing, to facilitate the management of certification and marketing [25].

Access to technology by Cemara Labat society was still difficult. Technology had important ecologic and economics dimension [4]. Infrastructure was as the main condition so the aquaculture development could effectively occurred like finding result [26]. In addition, bad infrastructure was as the constraint of village farming in Indonesia and there was negative effect due to the lower infrastructure quality

CONCLUSION

Aquaculture practice had been carried out as the alternative for increasing fishery product now. Result of research showed that experience and knowledge about aquaculture was still necessary to be significantly increased. Policy maker and interest holder were needed to more understand the implementation process of aquaculture knowledge so the dissemination and adoption process became more effective because society interest for managing aquaculture was still high and it could socially be accepted although access to technology was still difficult and the infrastructure condition had still not satisfied. The better market access was still very important for producer on small scale in study location. Government had to promote aquaculture integration on small scale into global market economy, to increase competitive power by facilitating cooperation among sector, collaboration, and experience sharing, to facilitate management, certification, and marketing.

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