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Adaptation of Community Seaweed Farmer in Dealing with Climate Change (Case Study in the Village Seriwe District Jeroaru)

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Abstract: ***In the short term, this study aims to: 1) describe the behavior of fishermen in adapting to climate change, 2) describe patterns of distribution and allocation of working time, patterns of production and consumption patterns of households seaweed cultivators. The research method applied in this research is descriptive method that is designed in the form of survey research. To determine the behavior of fishermen in adapting to climate change used descriptive method, whereas to determine the pattern of distribution and allocation of working time, patterns of production and consumption patterns of households seaweed cultivators used descriptive method through simple tabulation. The study concluded that 1) the behavior of fishermen in adapting to climate change based on the results of many years experience, 2) the allocation of working time household fishermen increased as a result of additional seaweed farming activities, 3) Extra work time household fishermen an average of 90 hours in 1 year, 4) Source of household income derived from activities in fishing, then of seaweed cultivation, and a small portion comes from trade and labor, 5) the pattern of household expenditure fishermen still largely consumption and a small portion for productive activities***

Keywords: allocation, behavior of fishermen, income, patterns of production, working time

1. Introduction

Empowerment of the poor, including coastal communities is a national movement launched by the government through various empowerment programs. In order to accelerate development in coastal areas need for programs to reduce poverty, reduce unemployment and boost economic growth. One way to empower fishing communities is to develop the potential resources available in the area around the fisherman. The biggest potential available is the development of seaweed cultivation or in terms of model development minapolitan seaweed. With the creation of employment and work outside the fishing effort, it is expected that a fishing community in this area will increase productivity, income and welfare.

The production potential of seaweed farming in NTB reached 41,000 hectares with a potential production reached 800,000 tons, while the target to be achieved in 2013 was 1,000,000 tonnes (Anonymous, 2009). According to the Department of Fisheries and Marine NTB (2012) production has reached new grass of 370,359.39 tonnes in 2011. This means it is still opens a significant opportunity to further increase seaweed production in this area. Increased production through the development of seaweed farming needs to be done because there are several considerations, namely a) a request for the export market is still big, b) technology is very simple, c) absorbing labor quite a lot, d) land eligible widely available, and e) products processed lot.

The ebb and flow of production and the income of fishermen in the village Seriwe highly dependent on weather conditions and local climate. Weather conditions and climate may change in the years in question and could affect the results of the resulting production. Then how fishermen can respond and adapt to climate change in order to maintain production can be produced throughout the year.

As a fisherman households certainly the decision to take chances and opportunities to increase productivity and family income is highly dependent on the behavior of households own and the value system that has developed in the middle of society. According to King in Halide (1981) in the theory of household economy (household economics theory) considers that the activities performed by each member of the household is the decision household and each member of the household in the allocation of time faced with three options, namely the time to work in the market, the time for action household and time for the physiologic activities.

It is relevant for further investigation is whether to take advantage of opportunities to work in seaweed farming activities, the available labor in the fishing village Seriwe households will use their time optimally or not, how the behavior of households in the face of climate change? To answer these problems will be approached with the theory of subjective equilibrium (subjective equilibrium theory) (Kurada, Y. and P. Youtopoulus, 1980) and (Nakajima, C., 1969), namely by looking at changes in household behavior seaweed farming in the face of change climate.

In detail, this study aims to: 1) describe the behavior of fishermen seaweed farmers in adapting to climate change, 2) describe patterns of distribution and allocation of working time, patterns of production and consumption patterns of households seaweed cultivators.

2. Research Methods

2.1. Research design

This research uses descriptive method. Research with a descriptive method that is designed in the form of survey research (Nazir, M, 1983). The data collection was done by using triangulation, ie by marrying three research techniques

together, namely: (1) interview (interviews) with the respondent; (2) the observation field (field observation); and (3) literature (desk study).

2.2. Determination of Research Areas

The study area is the District Jeroaru East Lombok. From a number of coastal villages there been one village then performed the survey on household fishermen. Households fishermen in the research samples selected at random sampling of 20 households.

2.3. Variables and Data Research

The main variables in this study is related to four aspects, namely: (1) the pattern of adaptation to climate change, (2) the pattern of distribution and allocation of work time member of the household; (3) the pattern of production or household income; (4) the pattern of household consumption or expenditure. Variables and research data collected are as follows: 1) Allocation of working time household members (W), 2) Structure of household income (Y), 3) The structure of household consumption or expenditure (P).

2.4 Data analysis

The collected data were then classified and grouped for further analysis:

1) To determine the behavior of fishermen households in adapting to climate change used descriptive analysis
2) To determine the pattern of distribution and allocation of working time, patterns of production (income) and the pattern of consumption (expenditure) of households were analyzed descriptively.

3. Results and Discussion

3.1 Patterns of Adaptation in Climate Change

Understanding climate change, according to Wikipedia is the change that occurred significantly regarding weather patterns are calculated based on the statistics in the time range of tens to hundreds of years. Many factors influence the climate changes such as biological processes, solar radiation, pressure tectonic, volcanic eruptions, and many more (Anonymous, 2014). While understanding of climate change according to the Environmental Protection Agency (EPA) is a significant climate changes that occur in a specific time period. In other words, climate change can also be interpreted as a drastic change in temperature, rainfall, wind patterns, and so forth. Keep in mind that the earth's temperature one degree of change within the last 100 years.

In fishing by fishermen known for their fishing season, ie certain times of the year to provide optimal catches. According Heliyana and Husni, S (2007) generally by fishermen fishing season is divided into two seasons, seasons western and eastern season. In the village Seriwe Jeroaru District of East Lombok Regency fishermen also refer to it as West season (October to March) and East season (April-September). Change this season as a result of climate change where climate change is a change in temperature, air pressure, wind, rainfall, and humidity as a result of Global Warming.

In relation to climate change, the fishermen can adjust cultivation activities in order to maintain their production and income. In west season generally runs in the month of October to March. In these conditions the fishermen generally do not go to the sea or to fish in public waters. This is caused by the bad weather that could endanger the safety of the fishermen. This situation did not last long, only lasted about a month (according to the experience of fishermen). In the west this season there is also a higher rainfall which causes the temperature of the sea water is low. More passionate fishermen cultivate seaweed in the west this season. According to fishermen seaweed growth in west monsoon is quite good. Seaweed production could reach 300 percent to 500 percent in one plant. This means that with 100 kg of seeds will result in the production of 300 kg to 500 kg in one plant.

In the east the season generally runs from April to September. In this season the rainfall began to decrease, the temperature of sea water began to rise. These circumstances make it difficult for normal growth of seaweed and is also followed by the growth of small algae that can be attached to the shaft of the seaweed. Similarly, the attack of diseases such as Ice-Ice this season. In the east this season generally can only sustain fishing seaweed plants for breeding only. The reason is so that the seaweed is not extinct, and can be maintained for production in the next time. In the state of seaweed production began to decline, fishermen began to take into account the income derived from seaweed farming activities. To add to the household income, the octopus fishermen arrests around the open waters. Usually the fishermen are looking for octopus in one day up to three days at sea. The catch of octopus is quite large and can generate additional income of fishermen. The average price of octopus wet between Rp 26,000, - to Rp 30,000, - per kilogram. Generally, the purchase catches of octopus are collectors then traders took him to Surabaya.

Ways fishermen adaptation to climate change (in conducting cultivation of seaweed) gone on long enough. So from experience gained over the years and then studied and used to address the problems as a result of climate change. If the climate changes, the fishermen have to understand what they should do in seaweed farming and fishing activities in general.

3.2 Working Time Allocation, Income and Expenditure Household Fishermen

3.2.1. Time Allocation Work Fisherman

Allocation of working time referred to in this study is the number of hours devoted by members of fishing households for productive purposes or to earn income, either from activities Capture of fish or seaweed cultivation. Therefore, theoretically the addition of fishing activities in the household will increase working hours for household fishermen.

The results showed that the average working time devoted fisherman household as much as 1408 hours in a year. Total

working hours is measured in seaweed farming activities and from fishing. During the execution of the addition of seaweed aquaculture fishermen working time by an average of 90 hours. This extra time do start to make a raft, tying seedlings, planting, and maintaining seaweed. When measuring the number of working days has been devoted by households of fishermen, the number of working days devoted as many as 201.14 a day (1408 divided by 7) assuming fishing households use the time to 7 hours a day. This means that during (before their seaweed farming activities) fishing households use their time to find fish by the time average of 188.28 days. When compared with the available time or normal time that is equal to 240 hours per day, it is still time enough. Therefore, there is still ample time for fishermen to increase activities outside the daily activities as fishermen in order to supplement their household income.

3.2.2 Fishermen Household Income

The income of fishermen is determined by the household working hours are concerned, especially households that do not have the capital and skills in addition to skills as a fisherman. Revenue derived from working hours in this study is referred to as labor income. In addition to the household income is determined by the income derived from outside the outpouring of labor referred to as non-labor income, such as transfers from other parties, leasing of capital assets including interest.

Fishermen household income is highly dependent on the general that catches from fishing in public waters, the catch is usually in the form of tuna, oil sardine, octopus, squid, tuna, and anchovies. While catches of the net results obtained in the form of a crab or crab.

Average revenue per household in a year fishermen from the fishing sector alone amounting to Rp 22,767,387, -. Additional revenue from outside the fishing sector as laborers, bedagang, and the farmer is to help to meet the needs of everyday life. After seaweed farming households conducted by fishermen, so no additional income from the cultivation of seaweed which is around Rp 11,518,548, -. Additional revenue is still not able to improve the productivity of work in seaweed cultivation, because the income earned is used to meet the needs of everyday life, yet can increase activity in seaweed farming in a broader sense as a place to plant seaweed is still as before, his raft yet increased.

Planting the bamboo raft has limitations that area where planting is relatively small, relatively short lifespan (approximately 1 year), easily washed away. This limitation led to the production of seaweed also be affected by means poduksi seaweed may decline, and ultimately led to the fishermen's income from seaweed will also decrease.

Fluctuations in seaweed production as a result of natural influences (weather and climate and disease) as well as human activities, causing the price of seaweed fluctuate sharply, for example, at certain times the price can reach Rp 13,000, - per kilogram of dry and at other times the price drops to USD 6.000, - per kg dry. Buyers usually derived from merchant collectors and agents, wholesalers and there is also a portion of the government (Department of Fisheries). Reason seaweed quality are the reasons that often the main factor that causes the price to go down. In the village of Seriwe indeed have created a seaweed drying to maintain the quality of seaweed, however, not many fishermen who use the drying facility. This is also a factor that can cause prices to decline seaweed.

3.2.3 Household spending Fishermen

Routine spending fishermen household is determined by household income and consumer behavior of households concerned. Household expenditure fishermen can be broadly divided into two: food expenditure and spending on non food.

The fishermen household expenditure comes to food that is 69.21%, and the largest expenditure of this food is for the side dishes of rice by 30.47% and 25.10%. According Sudibyo, B. (1995) This shows that households are still relatively poor fishermen, because according to the law Engel (Engels Law), the greater the proportion of household spending on groceries, the more poor households concerned. It is increasingly clear that domestic fishermen who make their livelihood in the fishing sector mostly have weak economic conditions. It is mostly due to the more limited work opportunities are seen as the negative influences of the livelihood of the working time of household members which leads to lower household income and expenditure.

Changes in household expenditures fishermen may be due to an increase in household incomes from seaweed farming. Increased household expenditure is large enough that the fishermen of Rp 19,941,790, - to Rp 29,707,758, - or an increase of Rp 9,765,968, -. Additional revenue from seaweed farming households fishermen quite helpful in meeting daily needs such as eating, drinking, and the secondary needs. Among the fishermen households, the extra income, there used to buy cattle, additional motor loans, home repair, and some is stored for education and health needs of the family. Judging from the pattern of household expenditure made by the fishermen, the spending patterns of this kind already reflect spending patterns productive. Although most of the fishermen household income supplements used for consumptive purposes, but the fishermen household maintains seaweed cultivation in scale at first.

4. Conclusion

4.1 Conclusion

Based on the results of the study can be summarized as follows:

1) The behavior of fishermen in the face of climate change adaptation based on experience. Based on many years of experience later studied and performed the action in the cultivation of seaweed
2) The outpouring of household labor time fishermen increased after seaweed farming activities, namely an increase of 90 hours. The average working hours of fishermen households in 2015 amounted to 1408 hours

3) The household income of fishermen are still mostly from fishing and partly derived from seaweed cultivation, and also from trading activities, and labor
4) The pattern of household expenditure fishermen still consumptive, though a few are already leading productive activities.

4.2 Suggestions and Policies

1) The outpouring of working time household fisherman still needs to be improved further through seaweed farming activities on a larger scale in order to increase revenue and productivity
2) Assistance to fishermen households still needed in order to improve the outpouring of the time it works in productive activities
3) Policy and welfare programs increase household income through the cultivation of seaweed fishermen are very suitable for fishing households.
4) Necessary government interference in price stabilization seaweed at the producer level, with emphasis on the buyer's agent seaweed. In addition to collecting traders and wholesalers who have been there, it should also be built seaweed processing factory to process raw seaweed into semi-finished goods or finished goods.
5) In the long-term need to build partnerships between fishermen and prospective investors and local governments to increase production, incomes and welfare of farmers seaweed.

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