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Economic Valuation of Lake Maninjau by using Productivity Approach

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Abstract: Lake Maninjau is a potential location for freshwater aquaculture. Floating net cage fisheries (KJA) aquaculture activities if not controlled will have an impact on the balance of the natural ecosystem, causing environmental damage. This study aims to assess the economic valuation of Lake Maninjau in the cultivation of floating net cages. The data used are the results of the 2014 Agam Agricultural census. The sample in this study were 187 owners of floating net cages in Lake Maninjau. This data was obtained from a survey of household fish farming business in 2014 which is a series of agricultural census in 2013. To analyze the economic valuation of Lake Maninjau used the Productivity Approach. The results of the study found that the KJA area of 187 fish farmers in Lake Maninjau with an annual crop area of 9,735,000 m2, with a total income of IDR 310,144 / m2, a cost of IDR 187,040 / m2, with an overall profit of KJA in Lake Maninjau IDR 162,862 / m2 . Based on the results of the study showed that KJA fish farming has economic benefits.

Keywords: Valuasi ekonomi, productivity approach, floating net cages (KJA)

INTRODUCTION

Many countries face challenges where they must be able to choose or be faced with a trade off, namely between increasing economic growth or protecting the environment (ecosystem conservation). Several previous studies concluded that the use of natural resources must consider the value of ecosystem services for ecosystem sustainability. (Mueller, Hamilton, Doole, Abell, & McBride, 2019) revealed that when considering the value of ecosystem services, intensive agricultural land use is not necessarily the most economically valuable in terms of lake catches. Shifts to alternative land uses in water catchment areas can lead to sustainable economic benefits and improved water quality. The results of this study indicate that when the value of ecosystem services is considered, the most effective option for improving water quality with the highest economic gain is the conversion of intensive land use types to exotic or indigenous forests. These benefits are related to various ecosystem services provided by forest cover, specifically the supply of raw materials, waste treatment and climate regulation functions, erosion control and nutrient cycles, and recreational values.

Furthermore (Meinard & Grill, 2011) states that the idea of evaluating biodiversity economics poses major philosophical and practical challenges, mainly due to the fact that biodiversity is abstract goods. (Hervani, Sarkis, & Helms, 2017) show that environmental goods, economic valuations enable organizations to measure the results of qualitative improvements. Economic valuations on environmental goods can be used as a basis for macro policies or broader policies.

Utilization of natural resources must still consider the preservation of nature. One way to maintain natural ecosystems is to calculate the economic value of natural resources. The aim is to advance the link between natural resource conservation and economic development. Fauzi (2006) states that economic valuation can be used as a tool to increase appreciation and public awareness of the environment.

Lake Maninjau functions as a tourism, energy and electricity sector, agriculture, services and trade, livestock, fisheries, settlements, protected forests and cultural reserves. One of the functions of Lake Maninjau that has a significant impact on the activities of other sectors is the aquaculture sector using floating net cages (KJA). The management of Lake Maninjau's sustainability area is regulated in Agam District Regulation Number 5 of 2014. Article 7 paragraph 2 stipulates that the carrying capacity and capacity for KJA in the lake area refers to the ability of Lake Maninjau waters to digest organic waste from fishery activities which is equivalent to 1,500 units or 6,000 5x5 m2 plot per karamba plot.

However, BPS Agam data shows that in 2017 the number of KJA reached 17,000 plots or three times the maximum amount set. This causes water pollution due to the accumulation of leftovers in the bottom of the lake which is estimated at 95.34 percent, so that it has an impact on mass fish deaths, namely 160 tons of dead fish in Lake Maninjau KJA in February 2018 with a loss of around Rp 3.75 billion. Another impact is the decrease in the number of tourists who do not meet the 2017 target of 653,108 people.

The high demand for natural resources and the environment tends to cause excessive exploitation of natural resources and the environment, thus threatening the sustainability of the quantity and quality of resources, environmental degradation. In addition, the controversy between the magnitude of the benefits and costs of externalities that arise opens up opportunities for studies of the receipt of compensation funds from externalities that arise. Some parties who feel the loss will definitely receive compensation funds in lieu of the costs of externalities they receive, but instead those who benefit will declare refusing to receive compensation funds provided as such will legitimize the recipient to acknowledge that there have been negative externalities.

This study aims to assess the economic valuation of Lake Maninjau in the cultivation of floating net cages. So that policies can be drawn up related to the use of natural water resources, especially Lake Maninjau. The approach used in determining the economic valuation of floating net cages in Lake Maninjau is through the production approach. This approach measures the economic valuation of natural resources with the assumption that natural resources are seen as input to a final product that is of public value, and the production capacity of the natural resource is judged by how much it contributes to the final product (Adrianto et.al, 2007).

METHOD

To analyze the economic valuation of Lake Maninjau used the Productivity Approach. In this approach the economic value of floating net cages in Lake Maninjau will be produced. The data used are the results of the 2014 Agam agricultural census. The sample in this study were 187 owners of floating net cages in Lake Maninjau. This data was obtained from a survey of fish farming business households in 2014 which is a series of 2013 agriculture censuses.

To estimate the economic value of aquatic resources in the use of floating net cages in Lake Maninjau the following steps are needed:

1. Estimating the Production Function

$Q = \beta 0 X1 \beta 1 X2 \beta 2$ ..... $X4 \beta 4$ .... (1)

Where Q is the product of production, X1 is the Selling Price of Fish / kg, X2 is the sex, X3 is education (years), X4 is the respondent's age.

2. Transformation of Ln Q

$Ln\ Q = \beta_0 + \beta_1 Ln\ X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4$

3. Determination of Producer Surplus Value

$PS = ½\ X Q_{rata} X (P_{max} - P_{rata})$

$P_{max} = -a/b_1$

Because;

$Y = a + bx$, so : $x - P_{rata}$

$P_{rata} = (Q_{rata} - a)/b_1$

Where a is the intercept, b1 is the Regression Coefficient, P_{max} is the maximum price, P_{rata} Average price, and Q_{rata} is the average production amount.

RESULTS AND DISCUSSION

Characteristics of Respondents

Respondent characteristics were obtained based on the results of a survey of agriculture in Agam District in 2014. The number of respondents were 187 owners of floating net cages in Lake Maninjau.

Tabel 1. Characteristics of Respondents

Characteristics of Respondents		%
Age	22 – 28	6,99
	29 – 35	9,68
	36 – 42	22,58
	43 - 49	21,51
	50 - 56	21,51
	57 - 63	10,75
	64 - 70	4,30
	71 - 77	2,15
	78 - 84	0,54
Education	No School	5,9
	Elementary School	24,2
	Junior high School	29
	Senior High School	32,8
	Diploma 1/ Diploma 2	0,5
	Diploma 3	3,2
	Bachelor	4,3

Potential of floating net cages (KJA) in Lake Maninjau

Based on the results of the analysis it was found that the activity of floating net cages in Lake Maninjau has economic benefits. This can be seen from the processed data of fishermen's total income of IDR 310,144 / m2, with a cost of IDR 187,040 / m2, with the overall profit of KJA in Lake Maninjau IDR 162,862 / year. The number of floating net cages recorded is 9,735,000 floating net cages. Based on the results of the processed data can be obtained economic value of floating net cages of IDR. 1,585,465,575,096. This shows that Lake Maninjau has considerable economic value.

Table 2. Results of Economic Valuation of Lake Maninjau by using the Productivity Approach

Revenue	**310.144**
Cost	187.040
Profit	162.862
Size of floating net cages	9.735.000
Economic value of floating net cages	1.585.465.575.096

Table 3. Analysis of Multiple Linear Regression

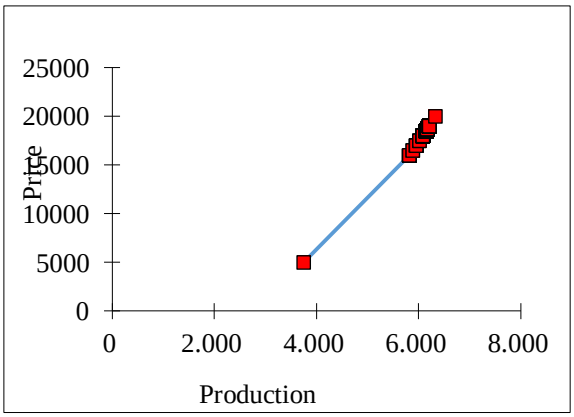
```
. regress lnQ lnp dgender yearsofschoolinng age

      Source |       SS       df       MS              Number of obs =     185
-------------+------------------------------           F(4, 180)     =    2.07
       Model |  9.69960189     4  2.42490047            Prob > F      =  0.0861
    Residual |  210.525687   180  1.16958715            R-squared     =  0.0440
-------------+------------------------------           Adj R-squared =  0.0228
       Total |  220.225289   184  1.19687657            Root MSE      =  1.0815

------------------------------------------------------------------------------
         lnQ |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         lnp |   .3605921   .7535995     0.48   0.633    -1.126434    1.847618
     dgender |    .723955   .2950194     2.45   0.015     .1418136    1.306096
yearsofschoo~g |  -.0058436   .0225432    -0.26   0.796    -.0503266    .0386395
         age |   -.007126   .0071636    -0.99   0.321    -.0212614    .0070093
       _cons |    4.27997   7.382708     0.58   0.563    -10.28782    18.84776
------------------------------------------------------------------------------
```

Based on the regression results of the production function of floating net cages in Lake Maninjau are as follows:

Ln Q = 4,28 + 0,36 Ln P + 0, 72 Dgender – 0,005YoS – 0,007Age.

Based on the results of the processed data, it can be seen that the price, education, and age do not significantly influence the production of floating fish cages in Lake Maninjau. While sex has a significant effect on fish production in floating cages. this means that if the manager of floating net cages is male, fish production will increase. This is because men are more skilled and agile in managing floating net cages, causing fish production to increase.

Based on the results of the calculation of the producer surplus can be obtained producer surplus of IDR 1,126 Billion/ year of the total sample obtained. This amount is obtained from the economic value multiplied by the total number of 187 respondents.



Gambar 1. Producer Surplus Curve

CONCLUSIONS

The results found that the total area of KJA of 187 fish farmers in Lake Maninjau with annual harvested area of 9,735,000 m2, with a total income of IDR 310,144 / m2, costs of IDR 187,040 / m2, with an overall profit of KJA in Lake Maninjau IDR 162,862 / m2 . Based on the results of the study showed that KJA fish farming has economic benefits.

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REFERENCES

Adrianto.L, Akhmad Fahruddin, Yudi Wahyudin, 2007. Konsepsi Valuasi Ekonomi Sumber Daya Alam dan Lingkungan. Modul disampaikan pada Kegiatan Pelatihan Teksnik dan Metode Pengump[ulan Data Valuasi ekonomi. Pusat kajian Data Valuasi Ekonomi. Pusat Kajian Sumberdaya Pesisir dan Lautan, IPB:Bogor.

Badan Pusat Statistik. 2018. Sumbar Dalam Angka. BPS; Provinsi Sumatera Barat.

Fauzi, A.2006. Ekonomi Sumber Daya Alam dan Lingkungan. Gramedia Pustaka Utama. Jakarta.

Hervani, A. A., Sarkis, J., & Helms, M. M. (2017). Environmental goods valuations for social sustainability: A conceptual framework. *Technological Forecasting and Social Change*, *125*(June), 137–153. https://doi.org/10.1016/j.techfore.2017.07.015

Meinard, Y., & Grill, P. (2011). The economic valuation of biodiversity as an abstract good. *Ecological Economics*, *70*(10), 1707–1714. https://doi.org/10.1016/j.ecolecon.2011.05.003

Mueller, H., Hamilton, D., Doole, G., Abell, J., & McBride, C. (2019). Economic and ecosystem costs and benefits of alternative land use and management scenarios in the Lake Rotorua, New Zealand, catchment. *Global Environmental Change*, *54*(October 2018), 102–112. https://doi.org/10.1016/j.gloenvcha.2018.10.013