Analysis of mangrove management to increase the economy of coastal communities in Madura island

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Abstract The purpose of the research was to analyze the effect of mangrove forest management on the economic development of the coastal community on Madura Island. This paper outlines the management of mangrove forests for economic development on Madura Island. The research method used quantitative and qualitative descriptive-analytic used quantitative data. Data collected by interview, observation, and literature study. Respondents in this study came from four districts in Madura, namely Bangkalan, Sampang, Pamekasan and Sumenep, which consisted of water management communities, Related Offices, Environmentalists, Academics, NGOs / Institutions, and CSR totaling 170 respondents. Data analysis tool was done by SEM Warp Partial Least Square method. The results show that mangrove forest management has a significant positive effect on economic development. Improving economic development, in this case, was increasing income, new employment opportunities, and mangrove sustainability.

1. Introduction

Coastal areas in Madura Island faced various pressures caused by the decline in natural resource quality [1]. This will lead to the imbalance of environmental conditions and existing ecosystems, if it continues to happen so that the public income and welfare will decline. That humans and environment are linked has been long asserted and measuring the degree and importance of those interaction has been kess of a core activity [2]. One of the most important ecosystems in the region Coastal is mangrove. The value of mangroves in seafood production would further increase by additional research on subsistence fisheries, biophysical support to other ecosystems, and the mechanisms which sustain aquaculture production [3].

The mangrove ecosystem is the gateway to other ecosystems, which are very vulnerable and often marginalized. The marginal effect of mangroves on total fish production is estimated by using a panel of fixed effects models[4]. This is due to the high activity of the community in conducting its economic activities. The mangrove ecosystem has been greatly reduced and fragmented over the last few decades due to excessive exploitation and development [5]. Human society has been and will always be faced with a decision on how to manage ecosystems for sustainability. This also applies to

the mangrove ecosystem which is often converted into alternative use, it is based on economic considerations by policy makers [6].

As a consequence, mangrove ecosystems have become prime candidates for conversion into large scale development activities, such as agriculture, aquaculture, forestry, salt ex-traction and infrastructure. More than 50% of the world's mangroves have been removed [7].The resource conflicts which occur in mangrove use are by no means peculiar to Indonesia: experience in other tropical countries, those in Southeast Asia in particular, has shown that proper management of the resource can avoid conflict and ensure long-term sustainability of the mangrove ecosystems. It is equally clear, however, that no *single* solution to proper mangrove management can be applied to all mangrove areas in Indonesia; both the problems, and solutions, are quite diverse. But failure to find and implement the appropriate management strategy can lead to substantial economic losses, ecological degradation, and where mangroves support important traditional livelihoods – increased social and political instability

The concept of implementation of economic development implemented by the Government in various regions including coastal areas today is directed to the concept of economic independence of the region based on the economic potential of the region or region and society is expected to be a source of regional economy, even national [8]. The government through the Ministry of Maritime and Fisheries since 1998 has pioneered the Co management approach in marine resource management, through the Coastal Community Development project and Fisheries resource Management [9].

2. Research methods

Research methods use qualitative and descriptive analytical approaches by using quantitative data. Data collection with interviews, observations and literature studies. Respondents in this research came from four regencies in Madura, namely Bangkalan, Sampang, Pamekasan and Sumenep consisting of coastal management communities, related agencies, environmental observers, academics, NGOS / institutions and CSR a total number of 170 respondents. Data analysis tool with SEM method of Warp Partial Least-Square. Data collection with interviews, observations and literature studies. Data analysis tool with SEM method of Warp Partial Least-Square.

3. Results and discussion

Of analysis results showed the co-management of mangrove significant positive influence on economic development. Economic development that is influenced in this order in sequence is increased revenue, new employment opportunities and the sustainability of mangrove. Based on a picture of conceptual model structural model PLS, explained that conceptual model related to mangrove Co Management to increase of community economy.

Table 1. Validity test parameters in PLS measurement

Validity test	Parameters	Rule of thumbs
Convergent	Loading Factor	More than 0.7
	Average Variance Extracted	More than 0.5
	9AVE) community	More than 0.5
Discrimination	AVE Root and Correlation Latent	Ave Root > Correlation Latent
	Cross Variables Loading	Variables More than 0.7 in one variable

Reliability test demonstrates the accuracy, consistency and accuracy of a measuring instrument in conducting measurements [9]. After the testing of the assumption of linearity and conducting testing (Inner Model) Further testing the Convergent Validity Outer Model, testing linear Validity structural Model (Outer Model) and testing the Composite Reliability Outer Model. Based on the results of analysis with the help of software WarpPLS obtained inner model results. The results of the test showed that the results of measurements in variables with formative indicators are not seen the value of the load factor, because the variables with formative indicators i.e. the management of mangrove and economic enhancement is essentially a regression relationship of the indicator to the variable,

hence the way to evaluate it is to see the value of the regression coefficient (T-statistic) and the significance of the So judging by the value of each indicator and its significance value. From the table above, it can be concluded that discriminant validity has been fulfilled, which is visible from the AVE root in the diagonal column greater than the correlation between the construction of the same column. This cross-loading result becomes an indication of the fulfillment criteria of discriminant validity. Construction reliability as measured by composite reliability values, the reliability construct if the composite reliability value is above 0.70 then the indicator is called consistent in measuring the variable variables. The test results showed that the construction of Co-management, and economic development had a composite reliability greater than 0.7 to be reliable. The importance of mangroves to economically important organisms was highlighted through a biogeographic analysis [13]which associated particular life stages of these organisms to man-grove environments. This kind of information is, however, limited in many areas due to lack of adequate research. The economic value of mangroves is usually underestimated, since only one or a few species of commercial importance are included in the evaluation, not acknowledging the large number of ®sh and shell®sh species associated with mangroves.

Table 2. Path coefficients and P values

	Path Coefficients	Standard Error for Path Coefficients	P-Values
Co Management > Economic development	0.212	0.093	0.012

The results of the test showed that the variable of mangrove Co Management was significantly positive towards increasing the economy with the path coefficient of 0.212 with P-values = 0.012 value smaller than $\alpha = 0.05$ (5%). Based on the results of the above calculation shows that the increase in coastal economies can be influenced by good mangrove Management Co. Economic enhancement form the increase in income, new employment opportunities and mangrove sustainability. Mangrove forest management efforts have been carried for to long out, but the damage still continues as a result of management that has not been well integrated. This shows that the management is still sectoral, high land conversion, and low public awareness of the importance of mangrove forests [10] and [11] stated that the presence of mangroves is in danger of being damaged and increasingly depleted.

The total area of the Madura Islands is approximately 5,168 km² or approximately 10 percent of the land area of East Java. The length of the island's mainland from the western end in Kamal to the eastern end in Kalianget is around 180 km and the width is around 40 km. The island is divided into four districts. With an area of 1,144 to Bangkalan, 75 km² is divided into 8 subdistricts, Sampang district has an area of 1,321.86 km², is divided into 12 subdistricts, Pamekasan Regency has an area of 844.19 km², which is divided into 13 districts, and, Sumenep district has a total area of 1,857,530 km², divided into 27 subdistricts spread over land, and islands [12]. The achievement strategy for target 14.2 sustainable management and protection of marine and coastal ecosystems based on the marine spatial strategy policy [13].

4. Conclusion

Co-management of mangrove can affect the economic increase of coastal communities, among others, including economic development that is influenced in this sequentially is the increase in revenues, new employment opportunities and mangrove sustainability.

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