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The Role of Stakeholders in Co-Management of Mangrove in The Economic Development of Coastal Villages on Madura Island

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INDEXING

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ABSTRACT

Economic development in coastal areas still requires special attention and is very important to do. Various kinds of factors can affect the process of economic development of coastal villages. One of the potential natural resources that can be managed to improve the economy of coastal communities is mangroves, but until now mangroves have not become a priority so that the condition is increasingly depressed. Efforts to improve the economy of coastal communities can be carried out with proper and correct mangrove management through mangrove co- management. The research was conducted on the coastal of Madura Island. The purpose of this study is to analyze how the role of stakeholders and institutions towards mangrove co- management and economic development of coastal villages. Research methods with in-depth quantitative and qualitative. Analysis using SEM Warp-PLS. The results of the research analysis show that the role of stakeholders and institutions has a significant positive effect on mangrove co management and the economic development of coastal villages on Madura Island.

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INTRODUCTION

Economic development in coastal areas still requires special attention and is very important to do. In looking at Indonesia's growth so far, empirically, marine and fisheries development has received less attention and has always been positioned as a fringe in national economic development. Indonesia is also known as an Archipelago State or an archipelago where the Geospatial Information Agency (BIG) recorded 17,024 official islands given 1 per 2023. Physical conditions like this certainly make Indonesia rich in marine resources and tourism, thus further strengthening the importance of the role of the maritime sector for Indonesia (Sapanli et al., 2020). Various factors can affect the economic development process of coastal villages. One of the potential natural resources that can be managed for the economic improvement of coastal communities is mangroves. However, mangroves have not been a priority until now, so conditions are increasingly depressed. Efforts to improve the economy of coastal communities can be

made by sustainably managing mangroves. This condition is stated by (Burhan Latif, 2018). Mangrove forests are a vital coastal and marine resource that supports life in this environment. It is considered a unique ecosystem because of its significant contribution to maintaining the ecological balance of the coast(Anuar & Mardan, 2025).

Handling integrated restoration with a priority scale to mangroves, coral reefs, estuary areas, and seagrass meadows can technically be done if there are institutions that handle it specifically. This institution contains elements of local, public, and private governments. This is according to the concept (Rudianto, 2018). Community-based and co-management approaches require that key stakeholders, most notably the resource users themselves, play significant roles and responsibilities in the management process (Worlanyo et al., 2016). (Maryani & Lambelanova, 2018) and (Muharuddin, 2019) conveyed the concept that the development of various related components is important in an effort to involve the role of stakeholders.

Coastal communities also have an equally significant responsibility, considering that their daily activities and livelihoods are highly dependent on existing resource services, and their activities' impact also significantly influences coastal and marine resources (Hamzah et al., 2020). (Purcell & Pomeroy, 2015) explained that coherence between government agencies related to managing marine areas is needed to support the success of co-management. Human societies have been and always will be faced with decisions about managing ecosystems for sustainability. Mangrove forests are highly productive ecosystems that typically dominate the intertidal zone of tropical and subtropical coastlines(Wang et al., 2019).

This research aims to analyze the role of stakeholders or institutions in mangrove co-management to achieve economic development.

LITERATURE REVIEW

Co-Management

As stated (Witarsa, 2015), the success of management with this co-management model must be significantly influenced by the government's willingness to decentralize responsibility and authority in management to fishermen and other stakeholders. Co-management combines the management of resources that have been widely done by the government (government-based management) with community-based management (community-based management) co-management: Fisheries Management Collaboration. The institutional aspects formulated by the village government are formed based on the village's character and work based on a co-management approach (Rudianto, 2016). Policymakers and mediators in ecosystem planning according to co-management institutional criteria (Hamzah *et al*., 2020).

Mangrove

Mangrove forest ecosystems have two main functions, namely ecological function and socio-economic function. Mangrove forests function as wave breakers and sediment traps. Mangroves also form a structure or distribution of mangrove vegetation that starts from the sea to the land, which is called mangrove zonation(Sunarni et al.,2019). Mangrove forests are under global pressure. (Huxham et al., 2015) Habitat destruction and degradation persist despite long-standing recognition of the important ecological functions of mangroves. Indonesia's mangroves are significant in national and

global climate change mitigation strategies. However, changes in mangrove forest cover (increases and decreases) have been observed globally as a result of the influence of environmental changes and human impacts (Suyadi, Gao & Lundquist, Carolyn J, 2019) and that means Indonesia has the most significant mangrove damage rate in the world. (Campbell, A.,&Brown, 2015) said there needs to be efforts to restore and develop mangroves in Indonesia. (Murdiyasso, D., Purbopuspito, J., Kauffman, J.B., Warren, M., Sasmita, S., Donato, D...Kurnianto, 2015) by preventing mangrove deforestation, Indonesia can meet a quarter of the 26% emission reduction target by 2020.

Factors Affecting Mangrove Co-Management

Co-management requires two large groups of stakeholders to share a role in management jointly. The two stakeholder groups are community groups and government agency groups. (Rudianto, 2016) also, co-management implementation in the long term is believed to provide better direction for changes. (Rudianto, 2018) explained that the key to successful management of coastal damage is institutional, both institutional related to community and government institutions. It is stated by (Alfandi et al., 2019) that community participation plays an important role in mangrove management because the community is at the forefront of preserving mangroves.

RESEARCH METHOD

Time and Location of the Research

The research was conducted on Madura Island, East Java. The selection of this location was purposive (determined); the reason for choosing this area is that Madura is an island that has a pretty good and diverse mangrove ecosystem. In addition, the coastal area was chosen because the socio-economic welfare level of coastal communities in Madura is still relatively low. This requires efforts to improve welfare by managing one of the marine and coastal resources with a relatively high economic potential value, namely the mangrove ecosystem. The research for 6 months was conducted from July to December 2019 in four districts, namely Bangkalan, Sampang, Pamekasan, and Sumenep. The object of the study was on the coast of Bangkalan, Sampang, Pamekasan, and Sumenep Regencies, where mangrove trees are present. From the sampling process, 170 respondents were obtained. The population in this study included coastal community groups, government institutions (related agencies), environmental observers, academics, NGOs/school institutions, and CSR. The coastal area of Madura was chosen based on the economic conditions of coastal communities, which are still relatively low, and mangrove management has not been carried out correctly and adequately.

Type and Source of the Data

The basic methods used in this research are descriptive and analytical. This research uses a quantitative approach. The research design or research design in this study begins with the formulation of the problem, formulating research objectives, identifying variables, determining data collection methods by distributing questionnaires to several selected respondents, and data collection techniques used. Then, the analysis model and estimation technique will be created and determined. The next step is to

interpret the research results to make research conclusions. The object of this research is stakeholders who play a role in mangrove management in Madura; this is in the concept of co-management to realize coastal economic development. The data will be processed according to the analysis needs based on the data obtained later to answer the problem formulation and make a hypothesis. The analysis used in this study is Structural Equation Modeling (SEM) using WarpPLS.

Data Collection and Analysis

The research site is along the southern coastline of Madura Island of East Java. The selection of locations and respondents purposively is choosing a coast that contains mangroves and their managers. This research is quantitative and qualitative in depth. Data collection is obtained by observation method, in-person interviews, and by providing questionnaires to respondents. Respondents' responses were known by measuring the Likert scale.

The sample number of 170 comprises community groups, government agencies, academics, NGO environmentalists, and CSR. The factor analyzed is the Role of Institutions or stakeholders (X3) in Mangrove Co-Management. Data analysis using the Structural Equation Model (SEM)-Partial Least Square method, then the results of calculations are interpreted and combined with qualitative data.

The population in this study was stakeholders in mangrove management on Madura Island. The sampling technique used was the Multistage sampling method. The sample included coastal communities managing mangroves, government institutions, academics, environmentalists, NGOs, and CSR in Madura, which consists of four districts: Bangkalan, Sampang, Pamekasan, and Sumenep. The involvement of various parties in this study aims to obtain an appropriate mangrove co-management model to develop the economy of coastal communities.

The problem regarding the role of stakeholders in mangrove management is analyzed. Data analysis is carried out descriptively using Stakeholder Analysis. Stakeholders are mapped into a stakeholder analysis matrix based on the magnitude of interest and influence. The magnitude of interest is assessed based on stakeholder involvement in educational forest management, stakeholder dependence on educational forests, each stakeholder's work program related to educational forests, the benefits obtained from educational forests, and the role played by stakeholders in educational forest management. Power instruments include condition, condign, and compensatory power, and power sources include personality and organizational power.

RESULT AND DISCUSSION

Institutional Role influences Mangrove co-management in Coastal economic development efforts. The analysis results using WarpPLS obtained a path coefficient value = 0.192 with a p-value of 0.021 at the set significance level of $\alpha = \leq 0.05$, so this hypothesis can be accepted. The path coefficient is positive, which indicates that the better the stakeholder role is, the better the mangrove co-management is in coastal economic development. In this study, the institutional role variable was measured by three indicators: the Role of the workforce, the Role of costs, and the Role of thinking.

The results of the empirical study show that the Role of stakeholders on the coast of Madura Island is still not good. The Role of the workforce indicates this, as does the Role

of costs and the Role of thinking of coastal communities and stakeholders, which only a group of people still carry out. These indicators illustrate that coastal communities in Madura already have knowledge of managing existing mangroves but are still limited. The results of this study confirm and strengthen the relationship between the two variables. The Role of stakeholders in mangrove management, as conveyed by (Wahyurini, 2017), Mangrove conservation efforts must always be carried out for this. Attention and cooperation between the government and the community are needed in this conservation effort. Community participation is important in mangrove management because the community is the front guard in maintaining mangrove sustainability—research (Alfandi et al., 2019). However, the significant results of the analysis indicate that the better the stakeholder role, the better the mangrove management will be.

Table 1. Validity Test Parameters in PLS Measurement

Validity Test	Parameters	Rule of Thumbs
Convergent	Faktor Loading	More than 0.7
	Average Variance Extracted	More than 0,5
	9AVE) community	More than 0,5
Discriminant	AVE Root and Latent Cross Loading Variable Correlation	AVE Root > Latent Variable Correlation Over 0.7 in one variable

Source :*Warp PLS analisys (2020)*

After testing the assumption of linearity and testing (*Inner Model*), then testing Convergent Validity Outer Model, testing Convergent. Validity Outer Model, testing Discriminant Validity Model Struktural (*Outer Model*), and testing *Composite Reliability Outer Model.*

Based on the results of the analysis with the help of WarpPLS software, the results of the inner model are as follows: The results of the test showed that the measurement results on variables with formative indicators do not see the value of the loading factor because variables with formative indicators on stakeholders or institutions are the regression relationship of indicators to variables, then the way to assess them is to look at the regression coefficient value (T-statistics) and the significance of the regression coefficient. So, look at the value of the indicator and its significance.

When the root of AVE is greater than the correlation of these variables, the validity of the discriminant is fulfilled. Overall, it shows that all institutional, co-management, and economic development variables have a square root value of AVE greater than the correlation value with other variables, so the validity of the discriminant is met.

Construct reliability is measured by composite reliability value. A reliable construct is if the composite reliability value is above 0.70, the indicator is consistent in measuring its latent variables. The test results showed that the construct (variable) stakeholders / institutional, co-management, and economic development has a

composite reliability value greater than 0.7. so reliable.

Table 2. Hypothesis Testing Results

No	Relationship between Variables (variable Response → Response variable		*Path coefisien*	*P- value*	Description
1	role of stakeholders (X)	*Co- Management* Mangrove (Y1)	0.192**	0.021	Signifikan

Source :*Warp PLS analisys (2020)*

The test results showed that stakeholders / institutional variables had a significant positive effect on Co-Management with a path coefficient of 0.192 where p-values = 0.021 is less than the value of α = 0.05 (5%). The direct influence of institutional role variables on mangrove co-management was 0.192, with a significant amount of 0.021. Institutional role variables significantly affect mangrove co-management because the p-value is less than 0.05. Thus, the third hypothesis, which states the role of positive and significant institutional influence, can be accepted. This analysis's results align with research conducted by Adelia R. (2010). Previous research has not been done to the fullest and has not provided good results. Value R2 = 0.33 (co-management) = 0.334. This indicates that the model can explain the co-management phenomenon by 33.40%.

Figure 1 shows the results of hypothesis testing and path coefficients in structural models.

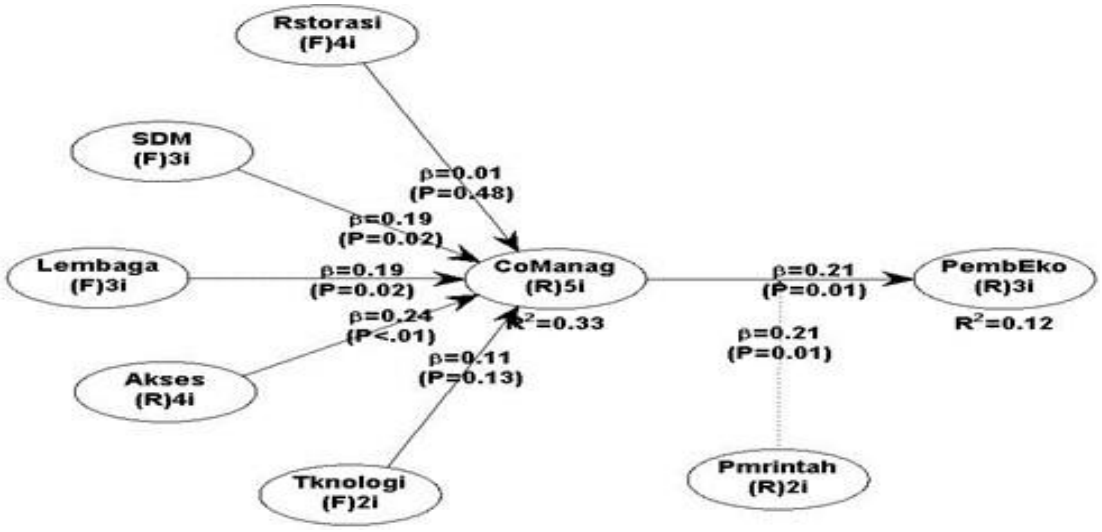

Figure 1. The results of hypothesis testing, path coefficients can be seen in structural models

Source : Warp PLS 2020

Mangrove co-management is one of the efforts to realize coastal economic development. One factor that influences the success of mangrove management is the role of stakeholders. Furthermore, the role of stakeholders also significantly influences mangrove co-management, which, as indicators, are the role of the workforce, the role of

costs, and the role of thinking. This variable has a significant influence on mangrove co-management in coastal economic development. The role of stakeholders, in this case, agencies related to mangrove management, includes the role of the workforce, the role of costs, and the role of thinking. All three roles need to be applied by the institution so that co-management objectives can be adequately realized.

Empirical facts in the field found that these institutions have performed their roles quite well, although not optimal. The role of the workforce can be seen from their participation in various mangrove planting activities. The findings in the field for this cost role still experience many difficulties. Several related stakeholders have not programmed and budgeted funds for mangrove management; this is after being investigated further because, in regional planning, there is no budget for mangrove management. There is no clear plan regarding mangrove management in the region, which is ironic considering mangroves' function and excellent benefits. The role of available costs for mangrove management significantly influences implementing mangrove co-management.

In addition, thinking is also very important and has a significant influence. Institutions must play a role in thinking about the concept of good and correct mangrove management; this will certainly significantly affect the proper regional regulations or policies for the existence of mangroves.

CONCLUSION

From the study results, the role of stakeholders or institutions shows that stakeholders / institutional variables significantly positively affect co-management with a path coefficient of 0.192. Stakeholders should conduct joint activities in support of mangrove management and the existence of regulations governing stakeholder cooperation to reduce sectoral ego.

The stakeholders' role in Madura Island significantly influences mangrove co-management in realizing coastal economic development. The role of stakeholders in the field is quite good. In order to improve the management of the mangrove ecosystem in Madura, active and collaborative involvement from all stakeholders in an integrated manner is required.

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