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Mangrove Forest Management Strategy as A Sustainable Production Forest Area in Luwu District, South Sulawesi Province, Indonesia

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Abstract. The study was conducted at the coast of Luwu Regency, South Sulawesi to determine the strategy of managing mangrove forests as production forest areas. Data collected in this study are primary and secondary data. The primary data was collected from informants and respondents through direct interviews, Focus Group Discussions (FGD) and field observation while Proportionate stratified random sampling was used. Interpretation of Landsat 8 Satellite Imagery utilized to determine the distribution and extent of mangrove forest areas on the coast of Luwu Regency. SWOT (Strength, Weaknesses, Opportunity, Threats) analysis are used to identify the internal and external factor. The results shown that the alternative strategy used is an aggressive strategy which is to take advantage of opportunities in achieving profitable opportunities by developing the potential of sustainable and economically valuable mangrove forest resources through eco-friendly cultivation and capture businesses, increasing the role of NGOs to increase knowledge and awareness community management of mangroves, developing the potential of mangrove forests as an ecotourism area, community empowerment through fishermen/farmers groups to create a household scale industry based on mangrove resources.

Keywords: Strategy, Community, Management, Mangrove Forest, Sustainable Production Forest

1. Introduction

Sustainable production forest is a forest that is able to produce products which has economic value used for the needs of life today and in the future. The benefits of various products and services from mangrove forests have been felt by humans, both in the form of wood and non-wood products. Wood products are used as light construction wood, boat building charts, bridges, fishing poles, charcoal, tanners, tannins, and pulp [1], [2], [3]. Non-timber forest products include jeruju crackers, candied and dodol api-api (*Avicennia* sp), honey bees, various shellfish handicrafts, sharing species of fish and crustaceans. Mangrove forest area also contributes nutrients to the surrounding ecosystem because mangrove litter that falls will decompose into organic matter [4].

Some people, in meeting their daily needs, they destroy mangrove forests. This can be seen from the conversion of mangrove forests into fish and shrimp ponds, settlement, industry, and logging for various purposes. The effect is the loss of mangrove resources in the form of mangrove wood which is very



economical. In fact, if the mangrove forest is managed wisely by paying attention to the methods of environmental sustainability it will actually generate a large amount of income. Therefore, it is needed a model, strategy and policy concept for the implementation of mangrove forest management in order to function as a sustainable production forest.

The concept of sustainable management of mangrove forests requires criteria and indicators to ensure a balance between economic, social and ecological dimensions of development. This will provide something that is desired by society as a whole. Several criteria have been developed to measure the performance of sustainable mangrove forest management such as enabling conditions for sustainable management, security of forest resources, health and condition of forest ecosystems, flow of forest products, biodiversity, soil and water, economic, social and cultural aspects [5].

Successful implementation of mangrove management policies is determined by law enforcement in coastal areas, collaboration between scientists, politicians, governments, stakeholders [6], product certification from mangrove forests, environmental management systems that do not damage the aquaculture system, obligatory reforestation for investors and institutional empowerment yag around mangrove forest areas [7]. Successful implementation of mangrove management policies is determined by waste management and pollution control; environmental education and education for the community; strategic development planning that considers the carrying capacity and carrying capacity of mangroves; tourism development that involves the community and local wisdom [8]. An integrated approach to all management in coastal areas using traditional ecological knowledge and involving coastal communities will also determine the successful implementation of a program [8].

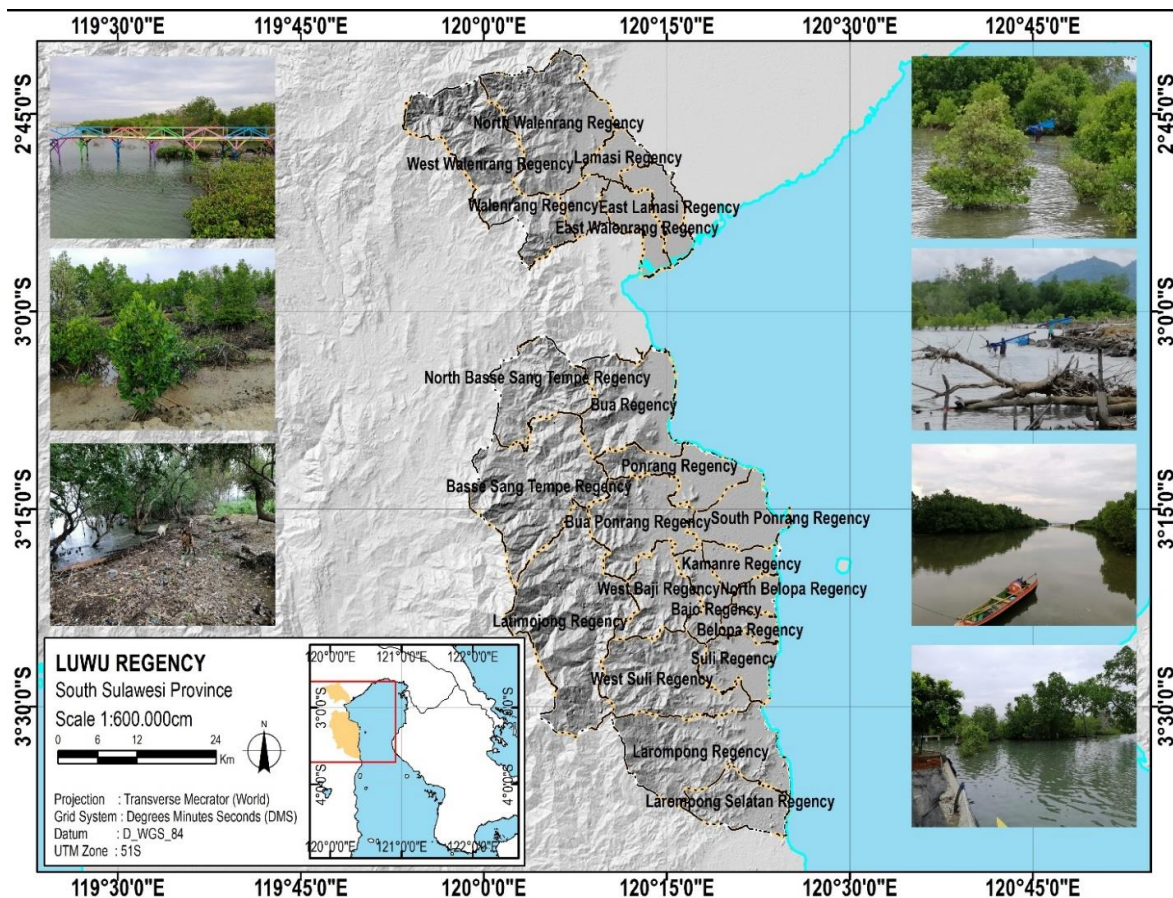


Figure 1. Luwu Regency

2. Methods

The study was conducted at the coast of Luwu Regency, South Sulawesi. This research is an applied research that aims to identify, analyze and make solutions to problems, then from the results of this study can be made models, policy concepts and their implementation for the broadest interests. Data collected in this study are primary data and secondary data. Primary data was collected directly from informants and respondents through direct interviews, Focus Group Discussions (FGD) and field notes. Secondary data obtained through citing data from research results, journals, books, reports that have relevance to the research conducted. Image interpretation is also carried out to obtain the distribution and extent of mangrove forest areas. The population of this research is people aged 20 - 60 years who live around the mangrove forest area of the coast of South Sulawesi. The sampling technique is carried out using proportional stratified random sampling, which is based on the stratification of the types of activities around the mangrove forest area. LandSat 8 Satellite Image Interpretation was also carried out, to determine the distribution and extent of mangrove forest areas in South Sulawesi. Analysis of internal and external factors that are supporting and inhibiting using SWOT analysis (Strength, Weaknesses, Opportunity, Threats)

3. Result and Discussion

The strategy of managing mangrove forests as sustainable production forests on the coast of Luwu Regency is carried out by analyzing external and internal factors that are supporting and inhibiting them. The factors consisted of:

3.1. External Factors

Opportunity

- Concern of NGOs and other social organizations
- Mangrove forest area can become a tourism center
- Products from mangrove forests can be used as a source of livelihood.
- Formation of employment from small and medium sector businesses

Threats

- Management of watersheds that are not environmentally friendly.
- Habits of the community throwing garbage around and in the mangrove area
- Conversion of mangrove forests into ponds conducted by people / entrepreneurs from outside the mangrove forest area
- In some places the mangrove forests have become increasingly narrow and critical
- Fishing boat traffic around the mangrove forest has not been well ordered.

3.2. Internal Factors

Strength

- Resources owned support.
- Model of sustainable management and community participation around the mangrove area
- Abundant economic potential of mangrove forests
- The fishing gear used is environmentally friendly and does not damage the habitat of aquatic organisms.

Weakness

- Lack of assistance in managing mangrove forest resources
- Lack of non-formal education
- Lack of involvement of the local community
- Fishermen / fishers only depend on previous experience.

SWOT Analysis

<p>External Factors</p>	<p>Opportunity (O) Awareness of NGOs and other social organizations in increasing public knowledge and awareness of the management and protection of mangrove forest resources. Mangrove forest area can become a tourism center Products from mangrove forests can be used as a source of livelihood. The formation of employment from small and medium sector businesses</p>	<p>Threats (T) Management of watersheds that are not environmentally friendly. Habits of the community throwing garbage around and in the mangrove area Conversion of mangrove forests into ponds carried out by people/entrepreneurs from outside the mangrove forest area Mangrove forest areas are increasingly narrow and critical Fishing boat traffic around the mangrove forest area is not well ordered</p>
<p>Internal Factors</p> <p>Strength (S) Resources owned support. Model of sustainable management and community participation around the mangrove area Abundant economic potential of mangrove forests The fishing gear used is environmentally friendly and does not damage the habitat of aquatic organisms</p>	<p>SO Strategy Develop the potential of sustainable and economically valuable mangrove forest resources through eco-friendly cultivation and capture businesses Increasing the role of NGOs to increase community knowledge and awareness in mangrove management Developing the potential of mangrove forests as an ecotourism area Community empowerment through fishermen/farmer groups to create a household scale industry based on mangrove resources</p>	<p>ST Strategy Make strict regulations on various activities around mangrove areas that have the potential to damage Involving the community in the management, supervision and enforcement of regulations to preserve mangrove forests Integrated mangrove forest management and transparency</p>
<p>Weakness (W) Lack of assistance in managing mangrove forest resources Lack of non-formal education Lack of involvement of the local community Fishermen / farmers only depend on previous experience</p>	<p>WO Strategy Assistance and organization of non-formal education for the community in order to increase their awareness of the importance of mangroves as production areas The involvement of the local community as a whole in the management and utilization of mangrove resources Training in the context of increasing and diversifying the economic value of mangrove forests</p>	<p>WT Strategy Increasing the participation of the government through socialization activities, guidance, counseling, and training in developing the potential of mangrove forests</p>

EFAS

Strategy Factors		Quality	Rating	Score
Opportunity				
Q1	The concern of NGOs and other social organizations in increasing knowledge and public awareness of the management and protection of mangrove forest resources.	0,06	3	0,18
Q2	Mangrove forest area can become a tourism center	0,08	3	0,24
Q3	Products from mangrove forests can be used as a source of livelihood.	0,15	4	0,60
Q4	Job creation from small and medium sector businesses	0,15	4	0,60
Q5	Utilization of mangrove fruit / leaves as medicine	0,10	2	0,20
Total		0,54		1,82
Threats				
T1	Management of watersheds that are not environmentally friendly.	0,08	2	0,16
T2	Habits of the community throw garbage around and in the mangrove area	0,06	2	0,12
T3	Conversion of mangrove forests into ponds conducted by people / entrepreneurs from outside the mangrove forest area	0,16	4	0,64
T4	Mangrove forest areas are increasingly narrow and critical	0,06	3	0,18
T5	Traffic of fishing boats around the mangrove forest has not been well ordered	0,10	4	0,40
Total		0,46		1,50
Bobot Total		1		

IFAS

Strategy Factors		Quality	Rating	Score
Strength				
S1	Owned resources support	0,14	2	0,28
S2	Model of sustainable management and community participation around mangrove areas	0,15	3	0,45
S3	Abundant economic potential of mangrove forests	0,08	3	0,24
S4	The fishing gear used is environmentally friendly and does not damage the habitat of aquatic organisms	0,15	4	0,60
Total		0,52		1,57
Weaknesses				
W1	Lack of assistance in managing mangrove forest resources	0,08	3	0,24

W2	Lack of non-formal education	0,15	3	0,45
W3	Lack of involvement of the local community	0,10	3	0,30
W4	Fishermen / farmers only depend on previous experience	0,15	2	0,30
Total		0,48		1,29
Bobot Total		1		

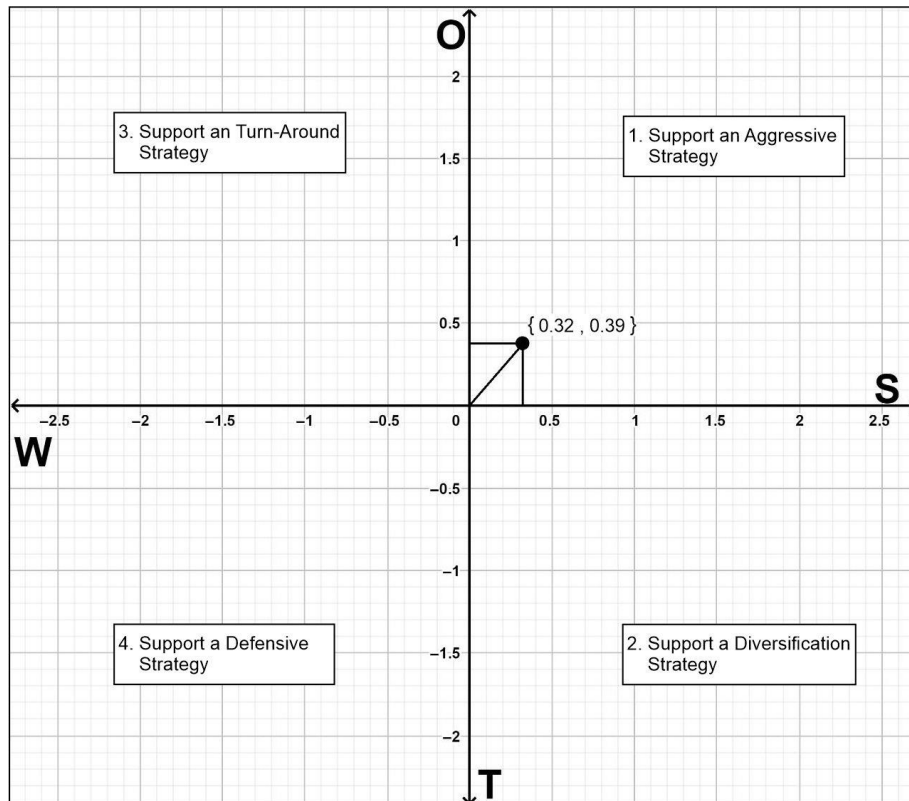


Figure 2. Swot Quadrant

Based on this value, the strategy lies in the first quadrant (I), which illustrates that the situation is very good because there are forces that are used to seize profitable opportunities. For this reason, the first alternative strategy (I) can be used, namely development (aggressive strategy). Based on this, the strategies adopted are:

- Develop the potential of sustainable and economically valuable mangrove forest resources through eco-friendly cultivation and capture businesses
- Increasing the role of NGOs to increase community knowledge and awareness in mangrove management
- Developing the potential of mangrove forests as an ecotourism area
- Community empowerment through fishermen / farmer groups to create a household scale industry based on mangrove resources

4. Conclusion

The alternative strategy used is an aggressive strategy, which is to take advantage of opportunities to win profitable opportunities, namely by developing sustainable and economically valuable mangrove

forest resources through eco-friendly cultivation and capture businesses, increasing the role of NGOs to increase community knowledge and awareness in mangrove management, developing the potential of mangrove forests as an ecotourism area, community empowerment through groups of fishermen / farmers to create a household scale industry based on mangrove resources

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