

# Factors Analysis of Mangrove Forest Ecosystem Conservation Strategic In Baguala Ambon Bay District, Indonesia

Salakory Melianus\*, Wicliel S. Pinoa\*\*, Revalda Amanda Yacoba B. Salakory\*\*\*

Department of Geography Education, Teaching and Learning Faculty, Pattimura University  
Dr. Leimena Street, Ambon-Moluccas

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**ABSTRACT** - This study aims to analyze about factors of mangrove forest ecosystem conservation strategy in Baguala Bay District. This research is a qualitative research. Data were collected through documentation and observation. Method analysis employed was SWOT. The factors of mangrove forest ecosystem conservation strategic in Baguala Bay District is four (4) variable, with following description: strengths is eight (8) indicators, weaknesses is seven (7) indicators, opportunities is nine (9) indicators and five (5) indicators.

**Indeks Terms** - Factors analysis, Conservation strategi, Mangrove forest ecosystem

## I. INTRODUCTION

Mangrove is a forest ecosystem in the intertidal zone of the tropics and sub-tropics. In general, mangrove grows along the coastline, is submerged by tidal waves, so that many mangroves receive organic material from the sea; it makes mangrove the most diverse biodiversity ecosystem in the world. However, most of the mangrove areas are intended for development activities which tend to lead to economic benefits. For the past three decades, Indonesia lost 40% of its mangroves due to various development activities, such as the conversion of mangrove to aquaculture, settlement, and other physical development areas spread almost throughout Indonesia (Purnobasuki, 2011).

Similar conversion occurred in the coast of Baguala Bay in Ambon, its coastal ecosystem is threatened due to development activities. According to Salakory et al. (2017), approximately 34.76 Ha of mangrove forests in 2015 were categorized as damaged with intermediate-rare tree density, spread across several locations including Passo of approximately 28.66 Ha, Negeri Lama of approximately 3.70 Ha, and Nania of approximately 2.40 Ha. Salakory (2018) also estimated that the economic value of ecosystem service lost due to mangrove forest damage amounted to IDR 3,765,838,300 per year covering 34.76 Ha of area. The estimated economic value of damage for the next 10 years until the mangrove forest ecosystem is recovered or close to the previous condition is IDR 297,900,800. From such amount, it is indicated that the economic value of damage would continue to decline every year along with the restoration of mangrove forest ecosystems. Thus, the correct conservation strategy is expected to accelerate the recovery of mangrove forest ecosystems in the Teluk Ambon Baguala Subdistrict in order to create a minimum economic value of damage. Prior to the formulation of mangrove forest ecosystem conservation strategies, it is necessary to conduct the SWOT analysis in terms of the conservation strategy factors.

## II. RESEARCH METHODS

Data were collected by employing the following methods (1) documentation, based on previous research and relevant references to collect data about factors of mangrove forest ecosystem conservation strategy in Baguala Bay District and (2) observations made through field surveys of observed objects to test the data accuracy.

Collected data were then analyzed using the SWOT analysis in terms of the conservation strategy factors, namely strengths (S) weaknesses (W), opportunities (O) and threats (T) (Rangkuty, 2013).

## III. RESULT AND DISCUSSION

There are four variables in the SWOT analysis, namely strengths, weaknesses, opportunities, and threats, with the unit of analysis being stakeholders related to the conservation of mangrove forest ecosystems. The following is the variables in the SWOT analysis in terms of mangrove forest ecosystem conservation in Teluk Ambon Baguala Subdistrict.

### a. Strengths

The strength identification was based on what can be developed in order to be more resilient in the mangrove forest ecosystem conservation in Teluk Ambon Baguala Subdistrict, which originated from the mangrove forest as well as the local government as the stakeholder. The strengths can be described as follows:

1. The Regional Regulation No. 24 of 2012 on Spatial Planning (RTRW) of Ambon for 2011 – 2021 which regulates mangrove forests as a protected area. The regulation is used as the legal basis for the mangrove forest ecosystem conservation in Teluk Ambon Baguala Subdistrict. Determining mangrove forest as a protected area can also be considered as a strength for the stakeholder in realizing conservation based on local wisdom by establishing the area as *sasi zone*.
2. Approximately 65% of the mangrove areas in Ambon are located in the vicinity of Baguala Bay. The total area of mangrove forests in this area reaches 52 Ha, which indicates that Baguala Bay in Ambon has extensive mangrove forest areas as well as high economic value of the ecosystem service provided. The total economic value of the mangrove forest ecosystem in the Teluk Ambon

Baguala Subdistrict is IDR 7,273,222,250 per year, with per hectare value being IDR 767,962,000 per year. The high economic value of the ecosystem service provided by mangrove forests also contributes to the importance of conservation in this region.

3. Mangrove forest damage is still classified as mildly damaged, of 34 hectares with the vegetation density being approximately 13 trees per hectare. Such a condition can be considered as strength for the stakeholder in conducting conservation, which is carrying out various restorations in the forest areas that are indicated with minor damage, considering the damage of the mangrove forest in this area is not too severe.
4. The economic value of the mangrove forest ecosystem damage in Teluk Ambon Baguala Subdistrict continues to decline each year along with the restoration of the ecosystem, from the initial value of IDR 3,765,838,300 per year to IDR 297,900,800. Thus, the conservation is expected to accelerate the recovery of the mangrove forest ecosystem in Teluk Ambon Baguala Subdistrict to create a minimum economic value of damage.
5. The mangrove restoration along the coast of Ambon Bay involves all groups including the community, the private sector, academics, practitioners and environmentalists. Restoration is a form of conservation carried out by the local government to increase the density of mangrove vegetation. Since restoration involves various parties ranging from the community, academics to environmentalists, it is certain strength in creating collaborative conservation. Collaborative conservation is considered to be important, since the government and related regional work unit require ideas and concepts from academics and environmentalists to assist the community in creating an effective and efficient mangrove forest management system.
6. The development of the mangrove forest can be an ecotourism destination. Ecotourism is basically a representation of conservation which contains elements of education and recreation (entertainment). Ecotourism is expected to be able to support the mangrove forest conservation through tree planting programs from each mangrove visitor.
7. Regular counseling should be conducted in terms of the importance of protecting and preserving mangrove forest for the community. Through counseling, the community can realize the importance of the existence of mangroves for the coastal areas, so that the community voluntarily participates in mangrove forest conservation. Counseling, when regularly conducted, can be strength in creating community-based mangrove conservation.
8. The presence of *kewang* (local given name for a forest and marine supervisor) established in accordance with the Decree of Mayor No. 753 of 2012 in each village/administrative village. *Kewang* is an important institution in the development of local wisdom-based mangrove forest conservation (*sasi*). *Kewang* was formed by the local government of Ambon to monitor the mangrove forest in Baguala Bay from various activities which disrupt the running of conservation activities.

#### b. Weaknesses

Weakness is defined as all factors which are considered to be a problem or constraint faced by the local government of Ambon in the mangrove forest ecosystem conservation in Teluk Ambon Baguala Subdistrict. The weaknesses are described as follows:

1. The economic value as a result of mangrove forest ecosystem damage in Teluk Ambon Baguala Subdistrict in 2015 was IDR 3,765,838,300 per year. Such figure constitutes 52% of the economic value of the total ecosystem services of the mangrove forest in this area. It indicates that by far various conservation efforts conducted have not been effective, since they have not been able to minimize the economic value of damage in the mangrove forest ecosystem.
2. The lack of information related to the economic value of ecosystem service lost due to damage in the mangrove forest is a weakness of the stakeholder in the planning of mangrove forest management, so that later it would affect the success of conservation of mangrove forest ecosystem. The economic value of ecosystem service lost for damage in the mangrove forest of 34.78 ha amounted to 3,765,838,300 per year. The stakeholder should clearly acknowledge the economic losses as a result of the damage, so that policies related to mangrove forest conservation can be formulated, and match the objectives.
3. In terms of restoration, mangrove planting is not balanced with protection and monitoring which results in failure. One of the weaknesses in the mangrove forest conservation in Teluk Ambon Baguala Subdistrict is that the lack of monitoring after restoration has caused the mangrove to not be able to develop well both due to waves and other natural factors, hence the failure.
4. The plant selection for the restoration often neglects the suitability to the environment, so that many plants did not grow optimally. The local government as the conservation implementer should adapt the types of plants to be planted with environmental parameters which determine survival and growth, namely supply of fresh water, salinity, nutrient, and substrate stability. The often occurring weakness in the restoration is the failure to take into the account the suitability of the type of plants with their environmental parameters, so that the conservation carried out is not successful and is temporary.
5. Overlapping functions and authorities occur in the management of the coastal area due to the lack of coordination between related regional work units. It indicates the weakness of the mangrove forest management system (from planning to evaluation), so that later the conservation implemented is ineffective and inefficient.
6. The planning management of the mangrove forest ecosystem does not involve the community as the users of ecosystem, since the system remains top down, not co-management. This leads to low community participation in the mangrove forest ecosystem conservation, so that the various programs implemented did not significantly affect the socio-economic life of the community as the policy recipient.
7. Weak sanctions and law enforcement against perpetrators of the mangrove forest destruction. Such weak sanctions cause high development in the mangrove forest area, which directly disrupt the sustainability of the mangrove forest ecosystem conservation in Teluk Ambon Baguala Subdistrict.

### c. Opportunities

Identifying opportunities is based on what can be achieved, from outside the mangrove forest area or from the government as the stakeholder in the mangrove forest ecosystem conservation in Teluk Ambon Baguala Subdistrict. Such opportunities can be in the form of conservation attempts conducted by the local government, communities, academics and environmentalists (NGOs), such as:

1. The applicable regulation or traditional custom of *sasi* is implemented in almost all regions in Maluku Province related to the utilization and preservation of the natural resources and environment. *Sasi*, as a traditional form of conservation implemented for a long time in the community, can be an opportunity to create local wisdom-based mangrove forest ecosystem conservation.
2. High level of public knowledge regarding the importance of mangrove forest ecosystem conservation can encourage the community to voluntarily participate in the conservation. It can be an opportunity in creating participatory and collaborative conservation.
3. The planting of mangroves in the coastal bay of Ambon by the community as a form of mangrove forest ecosystem conservation shows that the community is aware of the importance of maintaining the sustainability and survival of mangroves, so that it can be used as an opportunity to develop community-based mangrove conservation.
4. The high value of willingness of the community to pay (WTP) for the mangrove forest ecosystem conservation. The average annual value of WTP is IDR 4,300, higher than the value of paying for the government by individual or group conducting mangrove forest conservation from planting to supervision of IDR 3,000. It indicates that the community in Teluk Ambon Baguala Subdistrict gives a high value to every ecosystem service provided by the mangrove forest. The high value of WTP is an opportunity in the mangrove forest ecosystem conservation because such a value can be used as a reference in determining the value of payment for ecosystem service (PES).
5. Working groups reducing emissions from deforestation and forest degradation, increasing carbon stocks and forest conservation (REDD+) were formed based on Governor Decree No. 133 of 2012. It certainly can be used as an opportunity in creating collaborative mangrove forest ecosystem conservation.
6. The availability of corporate social responsibility (CSR) from various companies in Ambon is an achievable opportunity to create a collaborative and sustainable conservation.
7. Regional Regulation No. 10 of 2013 on the management of coastal areas and small islands (WP3K) is one of the legal bases which can support the mangrove forest ecosystem conservation in Teluk Ambon Baguala Subdistrict.
8. High level of academics, practitioners and environmentalists participation in supporting the mangrove forest ecosystem conservation, through education activities, seminars and workshops with relevant stakeholders is an opportunity to develop collaborative mangrove forest conservation by making them the community facilitator.
9. International funds are available for agricultural development by UN-formed organizations, International Fund for Agricultural Development (IFAD). CCDP-IFAD

is expected to be able to support community-based conservation through the establishment of mangrove conservation groups in each village in Baguala Subdistrict.

### d. Threats

Threat is a loss which can obstruct the mangrove forest ecosystem conservation in Teluk Ambon Baguala Subdistrict; it can be in the form of land conversion, sedimentation, and pollution in the area of Baguala Bay, Ambon. The threats are as follows:

1. The water quality in Ambon Bay is categorized as moderately polluted, in which the level of  $\text{NO}_3$  and  $\text{PO}_4$  have exceeded the set standard. Water pollution is a major factor in the death of some species of mangrove due to pneumatophores by pollutants. It certainly can be a threat to the continuity and success of the mangrove forest ecosystem conservation in Teluk Ambon Baguala Subdistrict.
2. The high level of sedimentation due to the flow of mud during the rainy season, which came from the residential land clearing in the hill area, Lateri Administrative Village is a threat to the mangrove forest ecosystem conservation due to the fact that too thick of sediments can cover the pneumatophores, causing mangrove death.
3. The ownership status of the mangrove area dominated by private property is a trigger for the high activity of mangrove trees clearing for physical development in the mangrove forest area. This, indeed, threatens the survival of mangrove vegetation because of the development activities, causing the conservation to be unsuccessful.
4. The high level of conversion of the mangrove area in private certified land is one of the threats which need to be considered by the local government in conserving the mangrove forest ecosystem. The externality of the mangrove forest conversion into settlements is a disruption to the continuity of mangrove restoration, causing death in mangrove vegetation.
5. The non-compliance of the perpetrators of the destruction to the Regional Regulation No. 24 of 2012 due to the absence of criminal sanctions against mangrove destruction. The perpetrators of destruction are only subject to administrative sanctions if the function of the mangrove forest is converted into a built area. It can disrupt the continuation of the mangrove forest ecosystem conservation in Teluk Ambon Baguala Subdistrict.

## V. CONCLUSION

The factors of mangrove forest ecosystem conservation strategic in Baguala Bay District is four (4) variable, with following description: strengths is eight (8) indicators, weaknesses is seven (7) indicators, opportunities is nine (9) indicators and five (5) indicators.

Output of analysis factors of mangrove forest ecosystem conservation strategic in Baguala Bay District can be recommendation for stakeholder to make the conservation and management policy of mangrove forest ecosystem in this region.

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of Geography Education Pattimura University,  
salakory.revalda29@yahoo.com

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## AUTHORS

**First Authors** - Salakory Melianus, Professor of Medical Geography, Department of Geography Education Pattimura University, salakory\_s3@yahoo.co.id

**Second Authors** - Wiclielief S. Pinoa, Social Economic of Geography, Department of Geography Education Pattimura University, wiclielpinoa@yahoo.com

**Third Authors** - Revalda Amanda Yacoba B. Salakory, Economic Ecology of Environmental Resources, Department