www.bircu-journal.com/index.php/birci
Budapest International Research and Critics Institute-Journal (BIRCI-Journal)
Humanities and Social Sciences
ISSN 2615-3076 Online)
ISSN 2615-1715 (Print)
Budapest Institute

Sustainable Marine Ecotourism Development Strategy in Merauke Regency

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Abstract

Merauke Regency is a plain area which is between 0-60 meters above sea level and the south and west are bordered by the Arafuru Sea. Flat areas become centers of population that use land for cultivation activities and become a concentration of settlements. While the coastline of the Merauke Regency is potentially developed into a maritime-based tourist destination, which is often called Marine Ecotourism. The research objectives are: designing a strategy for developing marine ecotourism in Merauke Regency. The research method used is the purposive sampling research design, expert system research methods, and analysis techniques with the Analystical Hierarchy Process (AHP). The conclusions in this study are: (a) The order of priority of goals is: goal of conservation of sustainable coastal resources, especially mangroves, growing a new center of economic growth, prepare the location of new marine tourism destinations, finally increasing contribution to local revenue. (b) Sequence as actors is: private, private together with the government, and government, and (c) Development sequence focus is: socio-economic engineering and integrated technology, namely integrated, the arrangement of acceptance to the marine tourism, management of coastal resources eksploitation speciality sand and mangroves, growing fishery-based agro-industry SMEs, and promotion and attract investors for the development of marine tourism.

Keywords
Marine Ecotourism;
Merauke Regency

I. Introduction

Ecotourism is a tour trip to an environment that is both natural and artificial and the existing culture that is informative and participatory that aims to ensure the preservation of nature and socio-culture (Yulius, Y. Ramdhan, Rahmania, R.R. Khairunnisa, T., 2018). According to the United Nations Environmental Program (UNEP) that Ecotourism must contain the following components: (1) Able to contribute to conservation activities and maintain biodiversity; (2) improving the welfare of the local population; (3) Tourists who come get experience and knowledge; (4) The participation of local people to play an active role in the tourism activities that are developed is emphasized (Ketjulan R., 2010).

Marine ecotourism is a type of special interest tour that has activities related to marine activities, both conducted under the sea and above sea level (Yulius, Y. Ramdhan, Rahmania, R.R. Khairunnisa, T., 2018). In general, marine ecotourism covers three regions, namely at sea level, under the sea and on the coast. Marine ecotourism is an eco-tourism based on maritime attractiveness in locations or areas that are dominated by water or marine. Marine Ecotourism, presents a typical marine natural ecosystem in the form of mangrove forests, marine parks, as well as a variety of fauna, both fauna at sea and around the coast (Ni Ketut Arismayanti., 2017).

Merauke Regency is one of the coastal areas in the southern region of Papua Province. This region is directly adjacent to the Arafura Sea. Where the beach length of 843.36 km stretches from the west to the southern part of the east. Along the coast there are many mangrove ecosystems that are still very good and very wide. Merauke Regency has an area of 4,672,382 Ha mangrove forest which is dominated by Avicenia, sp and Rhizopora, sp. While The potential fisheries catche in Merauke Regency is very large and diverse. The contribution of fisheries catch to the Merauke Regency Gross Regional Domestic Product (GRDP) in 2016 amounted to Rp. 1,729 trillion or 56.6% of the total GRDP of the agricultural sector. (Djamali, R. A. Betaubun, P. Hermanuadi, D. Syaban, R. A., 2016), (Djamali, 2017, and (Djamali, R. A. Betaubun, P., 2018). The marine ecotourism destinations of Merauke Regency are Lampu Satu Beach, Payum Beach, Onggaya Beach and Okaba Beach (BPS Kabupaten Merauke, 2017)

Seeing the potential of coastal resources that are still abundant along with the prospect of developing the needs of developing and introducing tourist destinations based on coastal resources, this research focuses on determining how to develop sustainable marine ecotourism strategies in Merauke Regency. It is hoped that this research can become a reference for optimizing the use of coastal resources based on the values of sustainability for all coastal and marine utilization in Merauke Regency.

II. Research Method

2.1. Research Methodology

The choice of research location is Merauke Regency because the area has a 843.36 kilometer long coast bordering the Arafura Sea. Most of these coastal areas develop relatively very good mangrove ecosystems (Djamali, R. A. Betaubun, P. Hermanuadi, D. Syaban, R. A., 2016). So that the region has great potential to develop marine ecotourism. In order to answer the purpose of this study, then using an expert system approach that is as a respondent or partner in this research involves a number of experts in the field of marine ecotourism consisting of 3 researchers from Musamus University, 1 person from the Bureaucrats, and 1 person from tourism practitioners. Data was collected by In depth interview technique in a Focus Group Discussion forum (Marimin, 2005).

2.2 Analysis Technique

The level of complexity of the problem in this study and tend to be semi-structured, then the most appropriate analysis technique approach is the Analysis Hierarchy Process (AHP). This method is used to make decisions from alternative choices with pairing methods (Djamali, R. A. Cahyaningrum, D.T. and Putra, D. E., 2021), (Marimin, 2005), and (Saaty, 2005). In this study consisted of 4 levels, each level consisting of several alternative choices arranged. Furthermore, it is arranged in a hierarchical structure consisting of: (a) Level1- Development Strategy, (b) Level 2-Priority Objectives consisting of 4 alternative choices, (c) Level 3-Actor consisting of 3 alternative choices, and (d) Level 4-Focus of development consisting of 5 alternative choices.

AHP Stages:

a. Graphically structuring the hierarchy, the AHP decision problem can be constructed as a multilevel diagram, starting with goals / objectives, first level criteria, sub criteria, and finally alternatives
b. Assessment criteria and alternatives criteria and alternatives are assessed through pairwise comparisons. The scale used ie 1 to 9 is the best scale in expressing or

presenting expert opinions (Mansiya K, Alma Z, Torgyn M, Marzhan M and Kanat N, 2014), (Saaty, 2005).

Table 1. AHP Assessment Score

Value of Importance	Explanation
1	Both elements/alternatives are equally impotant
3	Alternative A is a little more essential than alternative B
5	Alternative A is more essential than alternative B (strong)
7	Alternative A is definitely more essential than alternative B (very strong)
9	Alternative A is absolutely more essential than alternative B (very strong)
2, 4, 6, 8	Value between two close balances

c. Consistency of logic principles
Weighting matrix obtained from the results of the pairwise comparison should have cardinal and ordinal relations as follows:
   a. Cardinal relation: aij . ajk = ajk
   b. Ordinal relation: $A_i > A_j > A_j > A_k$, then $A_i > A_k$

d. Solving with mathematical equations. There are three steps to determine the weight, namely [10]:
   1. Step 1
      w_i / w_j = aij (i, j = 1,2,3 ... n); w_i = the weight of the input in the line; w_j = the weight of the input in the column
   2. Step 2
      $W_i = a_{ij} w_j$ (i, j = 1,2,3 ... n) for general cases have the form: w_i = (i = 1,2,3 ... n), w_j = average of ai1 w1, ..., ain wn
   3. Step 3
      If the forecast is good it will tend to be close to the wi / wj ratio. If n also changes then n is changed to λ maxs so that it is obtained

$$w_i = \frac{1}{\lambda \max} \sum_{j=i}^{n} a_{ij} w_j (i = 1,2,...,n)$$

Horizontal programming is intended to prioritize the decision elements at each level of the decision hierarchy. The stages are as follows:
   a. line multiplication (z) with the formula: $Z_i = \sqrt[n]{\prod_{j=1}^{n} a_{ij}}$
   b. calculation of priority vectors or eigen vectors

$$eVP_i = \frac{\sqrt[n]{\prod_{j=1}^{n} a_{ij}}}{\sum_{i=1}^{n} \sqrt[n]{\prod_{j=1}^{n} a_{ij}}}$$

   eVPi is the i priority vector element
   c. calculation of the maximum eigen value:
   VA = a_{ijx} x VP with VA = (V_{ai})
   VB = VA x VP with VB = (V_{bi})

$$L_{max} = \frac{1}{n} \sum_{i=1}^{n} a_{ij} \qquad VB_i \text{ for } i = 1, 2 ...., n$$

   VA = VB = Intermediate vector

d. calculation of consistency index (CI), this measurement is intended to determine the consistency of the answers that will affect the validity of the results. The formula is as follows:

$$CI = \frac{\lambda \max - n}{n - 1}$$

To find out whether a certain amount of CI is good enough or not, we need to know the ratio that is considered good, that is, if CR ≤ 0.1 CR formula as follows:

$$CR = \frac{CI}{RI}$$

III. Results and Discussion

Merauke Regency is the easternmost and southernmost position of the Republic of Indonesia. Strategic position in the farthest and most remote areas is a challenge to develop and utilize the potential of the region, which is almost all of its territory is coastal. This is due to the fact that most of the Merauke Regency is at an altitude of 3-44 meters above sea level (dpl) and only three areas namely the Muting, Elikobel and Ulilin Districts are at an altitude between 40-60 meters above sea level. So most of the areas interact directly with tidal activities, the ecosystem of almost all parts of the city of Merauke is overgrown with mangrove ecosystems in both categories (Djamali, 2017).

In designing a strategy for developing sustainable marine ecotourism in Merauke Regency, in this study the FGD approach involved experts from universities, bitrokrats, and tourism practitioners. In order to facilitate in completing the objectives of this study, then compiled in the form of a strategy then in te form of a hierarchical structure consisting of 4 levels consisting of:

1. **Level 1-*Goals*** *namely sustainable marine ecotourism development strategies in Merauke Regency*. Namely, strategic choices that can be used to develop the potential of positiation become the main choice in sustainable marine ecotourism in Merauke Regency by considering various factors / dimensions that are multi-dimensional. Strategic choices that can be made by policy makers are expected to increase the achievement of sustainable use of coastal resources
2. **Level 2-Priority Goals**: consisting of 4 choices of objectives consisting of:
   a. *growing a new center of economic growth* (EG); which is expected to develop a professionally managed marine ecotourism destination that will trigger the growth of new economic growth centers in Merauke. The centers of economic growth that are included are: will grow small businesses (SMEs) that are engaged in producing various kinds of food, beverage, handicraft products, including travel bureaus, homestays, and other supporting industries
   b. *conservation of sustainable coastal resources especially mangroves* (SC); namely the development of marine ecotourism that exploits the beauty of the potential of mangroves by emphasizing education on the importance of actively conserving mangroves that are very useful for improving the quality of human life and the environment (Djamali, R. A. Betaubun, P., 2018)
   c. *prepare the location of new marine tourism destinations (*TD), namely technical efforts that can be made to develop new marine tourism destinations in Merauke Regency. This is in view of the limitations of potential natural tourist destinations besides coastal and mangrove resources.

d. *increasing contribution to local revenue* (LR), it is hoped that with the growth of new ecotourism destinations and the growth of productive businesses that produce products, food, beverages, handicraft and other services will encourage and make a real contribution to the increase in regional origin.

3. **Level 3-Actor**:
   a. *Private* (P), as the executor of the development of marine ecotourism is expected to involve the private sector who want to invest in the development of the marine tourism sector in Merauke Regency
   b. *Private and Government* (P&G), as executors of the development of marine ecotourism, operational cooperation and / or other partnership models can be run to run a marine tourism business in Merauke Regency.
   c. *Government* (G)*;* as the main implementer in the development of marine ecotourism, which is centered on the Merauke district government as the actor. The consequence must be willing to allocate financial resources and human resources to manage the marine tourism sector in Merauke Regency
4. **Level 4- The development focus** consists of 5 choices:
   a. *the arrangement of acceptance to the marine tourism* (CS) area, namely the arrangement of illegal buildings so that the coastal area along the road leading to and around the marine tourism destination does not look dirty.
   b. *Management of coastal resources eksploitation speciality sand and mangroves* (RE), considering the exploitation of sand mines on the coastline in the Naukenjerai District is categorized as very severe (Djamali, 2017), then the development of marine ecotourism areas must be integrated with efforts to prevent and prohibit the exploitation of sand in the coastline.
   c. *socio-economic engineering and integrated technology, namely integrated* (SET) efforts in developing and developing marine ecotourism areas must pay attention to the integration of social, economic and technological aspects. For example, from the social aspect, there should be an effort to provide assistance to the community in the context of the socialization of saving the coastline from illegal sand exploitation and illegal mangrove logging. From the economic aspect, it is hoped that coastal communities will be stimulated through training and income in producing a variety of local food and beverage products. In terms of technology, appropriate technology needs to be prepared to increase the productivity of agro-industrial businesses so that the products produced are of good quality and good branding.
   d. *promotion and attract investors for the development of marine tourism* (PI). Potential coastal areas in Merauke Regency that still need good active role of local governments to promote and attract investors so they want to invest in marine ecotourism.
   e. *growing fishery-based agro-industry SMEs* (GA); namely small and medium scale agro-forestry which focuses on processed fishery products which are expected to be an attractive attraction for tourists visiting marine ecotourism destinations.

Broadly speaking, the description above can be described in a hierarchical structure as follows:

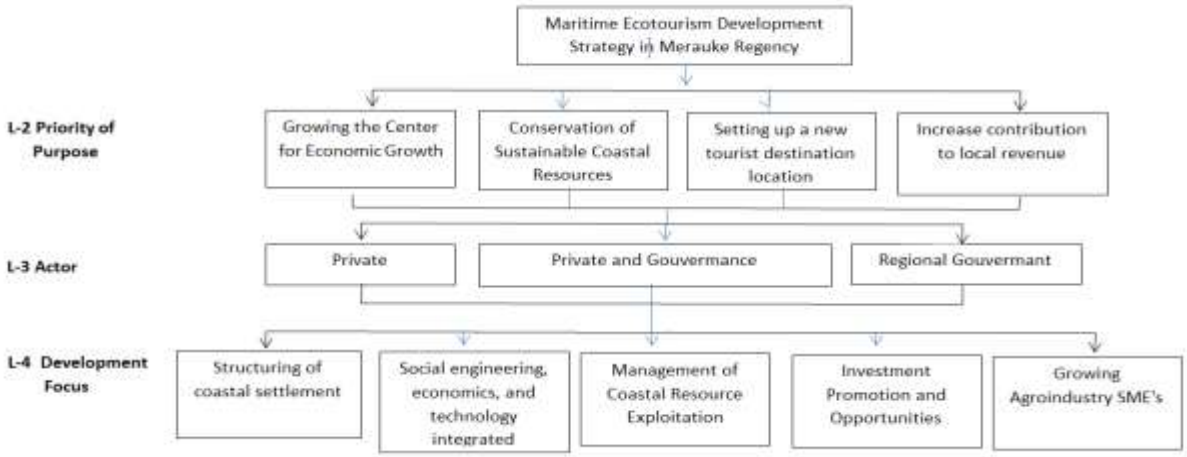

Figure 1. *Hierarchy Structure of Sustainable Maritime Ecotourism Development Strategy in Merauke Regency*

The experts who played a role in this study provided an assessment using the paiwise comparison method using a Likert scale. To test the results of the assessment conducted a Consistency ratio (CR) test that is the index consistency ratio divided by random index (RI). If CR <0.1 then the assessment is categorized as valid (consistent) or acceptable. Finalization of the overall assessment in a hierarchical manner between levels can be presented in the form of a Combined Matrix as follows:

Based on the table below shows that at level-2 priority goals that place the goal of conservation of sustainable coastal resources, especially mangroves (SC) ranked first with an average value of 0.484, then followed by growing a new center of economic growth (EG) with a value of 0.319 , prepare the location of new marine tourism destinations (TD) with a value of 0.124 and finally increasing contribution to local revenue (LR) with an average value of 0.074. This shows that in developing sustainable marine ecotourism, what needs to be laid out is how to utilize the potential of coastal areas to become a mission-based tourism destination. This is an obligation for all stakeholders to always increase awareness and play an active role in the sustainability of coastal areas.

Table 2 . Combined Matrix Level 2 to Level-3

		Level-2				Average	Rank
		EG	SC	TD	LR		
Level -2	Average	0,319	0,484	0,124	0,074		
	P	0,608	0,320	0,608	0,129		
	P&G	0,272	0,557	0,272	0,277		
	G	0,120	0,123	0,120	0,595		
Change Matrix Level 2 to Level 3							
Level -2	Pr	0,194	0,155	0,075	0,009	0,433	1
	P&G	0,087	0,269	0,034	0,020	0,410	2
	G	0,038	0,059	0,015	0,044	0,156	3

At level-3 as the main actor the main stream is emphasized is the private sector with an average score of 0.433, followed by a pattern of private sector partnership with the government (P&G) with an average value of 0.410, and finally the government sector. This shows that going forward in the strategy of developing marine ecotourism as the main actor is expected by the private sector to be willing to invest in and operate marine ecotourism development in Merauke Regency.

Table 3. Combined Matrix Level 3 to Level 4

		Level 3			Amount	Rank
		PR	P&G	G		
Level -4	Average	0,433	0,410	0,156		
	CS	0,269	0,269	0,269		
	SET	0,446	0,446	0,446		
	RE	0,151	0,151	0,151		
	PI	0,051	0,051	0,051		
	GA	0,083	0,083	0,083		
	Jumlah	1,000	1,000	1,000		
Change Matrix Level 3 to Level 4						
Level -4	CS	0,117	0,110	0,042	0,269	2
	SET	0,193	0,183	0,070	0,446	1
	RE	0,066	0,062	0,024	0,151	3
	PI	0,022	0,021	0,008	0,051	5
	GA	0,036	0,034	0,013	0,083	4

Based on the matrix of changes in level 3 to level 4 shows that the focus of development in the development of marine ecotourism places socio-economic engineering and integrated technology, namely integrated (SET) in the first rank with a value of 0.446, followed by the second rank namely the arrangement of acceptance to the marine tourism (CS) with a value of 0.260, followed for rank 3 Management of coastal resources exploitation of specialty sand and mangroves (RE) with a score of 0.151, ranking 4 namely growing fishery-based agro-industry SMEs (GA) with a score of 0.083, and the last promotion and attract investors for the development of marine tourism (PI) with a score of 0.051. This shows that the focus of the development of marine ecotourism, the main approach method is to do social engineering, economic, and technology in an integrated manner. Means that in the development of marine ecotourism must pay attention to the balance between social, economic and technological aspects. There needs to be integrated community education or education on the importance of developing marine ecotourism. It takes a period of social processes to instill the values and principles of saving the coastal ecosystem by introducing a number of environmentally friendly technology packages, which integrated and integrated can encourage the growth of productive businesses that process fisheries products. In the long term, it is expected to be able to improve the quality of human life and sustainability of the coastal ecosystem that supports the growth and development of a sustainable marine ecotourism industry.

IV. Conclusion

1. The order of priority of goals is: goal of conservation of sustainable coastal resources, especially mangroves, growing a new center of economic growth, prepare the location of new marine tourism destinations, finally increasing contribution to local revenue.
2. Sequence as actors is: private, private together with the government, and government,
3. Development sequence focus is: socio-economic engineering and integrated technology, namely integrated, the arrangement of acceptance to the marine tourism, management of coastal resources eksploitation speciality sand and mangroves, growing fishery-based agro-industry SMEs, and promotion and attract investors for the development of marine tourism.

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