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# Model Micro-ROS in Utilization of Sustainable Tourism

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**Abstract**—Manado City has a natural beauty and interesting art and culture that can be used as objects and tourist attractions. The natural beauty of Manado City can be seen in places such as Bunaken Island, Siladen Island and Manado Tua Island which are parts of Bunaken National Park. The beauty of Bunaken National Park has been known to the world, and until now the tourism mainstay of Manado city. The development of tourism is now experiencing significant progress, where every year the number of tourist visits increases. It should be realized that in addition to providing positive impacts such as improving the welfare and economy, tourism can also bring negative impacts to the environment of tourism. Negative impact is the form of environmental degradation if the utilization and management are not done carefully. Tourism city of Manado can be an example. Until now the mainstay of Manado City tour is Bunaken Island, Manado Tua and Siladen which are parts of Bunaken National Park but now there is environmental degradation due to the number of visits that exceeds the environmental carrying capacity. With the model Micro-ROS (Recreation Opportunity Spectrum) where small tourist areas with large tourist areas are considered equally important in providing tourism opportunities. With the enforced Micro-ROS model then the spike in the number of tourist visits will not be worrying because of the large selection of objects and attractions offered.

**Keywords**—model, Micro-ROS, sustainable

## I. INTRODUCTION

Manado City has an interesting natural beauty, art and culture and can be used as a tourist object and attraction. The natural beauty that dominates the city of Manado is Bunaken Island, Siladen Island, and Manado Tua Island which are parts of Bunaken National Park. The beauty of Bunaken National Park has been known to the world, and is currently a mainstay of the city of Manado.

Tourism development is currently experiencing significant progress, where each year the number of tourist visits increases. This has a positive impact on the progress of the economy and community welfare. Optimal utilization and management of all aspects related to the tourism industry starting from tourist objects and attractions, accommodation, travel, hospitality, restaurants, souvenirs, transportation, etc. will have an impact on social and economic life.

Based on data from the Central Statistics Agency (BPS), in February 2014 there were 702.7 thousand foreign tourists visiting Indonesia, and in February 2015 reached 786.7 thousand visits, up 11.95 percent. Furthermore, the number of foreign tourist visits in February 2016 reached 888.3 thousand visits, which rose 5.26 percent compared to February 2015 visits.

It should be realized that tourism, besides providing positive impacts such as improving welfare and the economy, tourism can also have a negative impact on the tourism object environment. The negative impact is in the form of environmental degradation if the utilization and management are not carried out carefully. Like what happened in Manado City tourism, until now the mainstay of Manado City is Bunaken Island which is part of Bunaken National Park, but currently there is environmental degradation due to the number of visits exceeding the carrying capacity of the environment. Management should pay attention to the balance between environment, socio-economic and socio-cultural, but in reality the environment is always far behind the economy. Stakeholders should pay attention to the sustainability of important dimensions of protected area governance [1].

If there is environmental damage, it will affect the number of tourist visits will be affected. The number of tourist visits seems to have a relationship with the extent of coral cover, where the number of tourists increases, the extent of coral cover decreases, and in the end there will be a decline in coral cover and the number of tourist visits will also decrease [2]. This is consistent with research conducted by Supit which states that the number of tourists and coral cover have a correlation [3]. With the new LAC model approach, Micro-ROS (Recreation Opportunity Spectrum) where a small tourist area with a large tourism area is considered equally important in providing tourism opportunities. With the adoption of the ROS model, the surge in the number of tourist visits will not be worrying because of the large selection of objects and tourist attractions offered.

### A. Formulation of the Problem

Bunaken is a tourism mainstay of Manado City which is currently experiencing environmental degradation because the number of tourist visits exceeds the carrying capacity limit. This is indicated by the decreasing area of coral cover. A

decrease in the area of coral cover automatically will also have a negative impact on the number of tourist visits. Not optimal management and utilization of all potential objects and tourist attractions that exist in the city of Manado both natural, artificial, arts and cultural tourism causes the pressure of the Bunaken neighborhood to increase. The problem occurs because:

- Lack of information obtained by tourists on tourist objects and attractions.
- Manado City Tourism is imaged as a "capsule image" namely Bunaken.
- Optimal management and utilization of all potential objects and tourist attractions that exist.

**B. Special Purpose**

Based on the problems mentioned above, the purpose of this research is: To analyze all the potential objects and attractions of Manado City.

**II. RESEARCH METHOD**

The model built in this study refers to the Micro-ROS Model which utilizes all the recreational opportunities that exist both small and large. This research was conducted through several stages which can be seen in Figure 1 flowchart of the research stage and process.

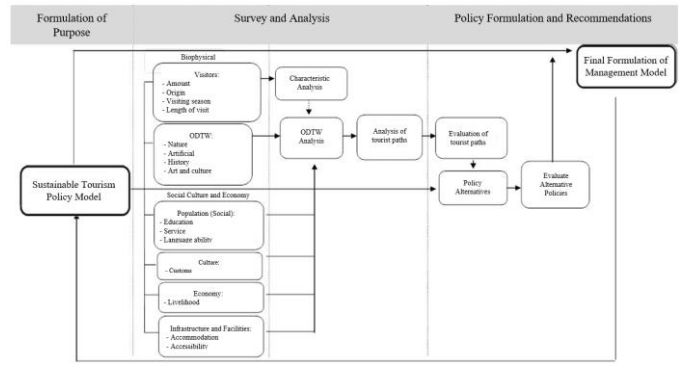


Fig. 1. Research stage and proces flow chart.

**III. RESULTS AND DISCUSSION**

**A. Socio-Economic Conditions**

The population of Manado City in 2012-2017 on average each year has increased by 1%. This can be seen in Table 1.

TABLE I. NUMBER OF RESIDENTS OF MANADO CITY (SOUL)

Year	Number of residents (souls)
2012	417.640
2013	420.401
2014	423.257
2015	425.634
2016	427.906
2017	430.133

Source: Central bureau of statistics (2018).

The number of schools in the city of Manado in 2015-2016 experienced an increase for high school and vocational schools, while for madrasah Aliyah decreased from 6 to 5 (Table 2).

TABLE II. NUMBER OF SCHOOLS BASED ON LEVELS

Year	TK	SD	Madrasah	SLTP	Madrasah	SLTA	Madrasah Aliyah	SMK
2015	129	263	13	89	11	45	6	32
2016	129	263	13	89	11	46	5	35

Source: Central bureau of statistics (2018).

The number of workforce who have worked in 2015 is 85.72% while the number of unemployed is 14.28%. In 2017 the number of unemployed decreased to 9.35 and the number of workforce that had worked increased to 90.65% (Table 3).

TABLE III. NUMBER OF LABOR FORCE

Year	Number of workforce	Number of worked	Number of unemployed
2015	193134	165561	27573
2017	194713	176510	18203

Source: Central bureau of statistics (2018).

Manado City's economy in 2014 decreased compared to that of 2013, from 7.16% to 6.69%. In 2016, there was an increase again compared to 2015, which was 6.39% to 7.19% (Table 4).

TABLE IV. ECONOMIC GROWTH OF MANADO CITY

Year	Economic Growth (%)
2012	7,11
2013	7,16
2014	6,69
2015	6,39
2016	7,19

Table 3 and Table 4 show that the economy in 2015 experienced a decline but the number of workforce that had worked increased. One of the factors that influence the increase in the number of workers is the tourism industry. This can be seen in Table 5 where the number of tourist visits in the city of Manado had increased since 2013-2017.

**TABLE V. NUMBER OF MANADO CITY TOURIST VISIT**

Year	Foreign tourist	Wisnus
2013	25.753	584.269
2014	34.443	832.015
2015	32.400	1.070.681
2016	47.103	1.484.402
2017	87.976	1.698.523

The number of visits the country has increased so the number of workers in the tourism industry has also increased. One of the tourism industry sectors that absorbs employment is the hospitality industry. As for the number of star-rated, non-star hotels and restructures in the city of Manado can be seen in Table 6.

**TABLE VI. NUMBER OF HOTELS AND RESTAURANT**

Hotel Classification			Number of Restaurant
Star/Non Star	Number of Hotel	Number of Room	
Bintang	22	2.556	472
Non Bintang	94	2.339	

**B. Potential Objects and Tourist Attractions**

Utilizing the tourism potential of Manado City from the results of the micro-ROS method will provide information and direction regarding land use based on needs that can be used sustainably. Evaluation of tourism potential biophysically is carried out by looking at the natural potential of the region, access to the area and the availability of supporting facilities. The evaluation results show that the Malalayang Beach and Boulevard Regions have the highest values on a scale of 5. This is influenced by the ease of access where the area is included in urban areas and is a residential area and has excellent supporting facilities (Table 7).

**TABLE VII. RESULTS OF EVALUATION OF THE POTENTIAL OF BIOPHYSICAL TOURISM AREAS**

Areas	Scales				
	1	2	3	4	5
Bunaken Island					OPQ
Siladen Island					OPQ
Manado Tua Island					OPQ
Malalayang Beach Zone					OPQ
Boulevard Zone					OPQ
Mangrove Forest Tongkaina					POQ
Mount Tumpa					OPQ

Description: O = access, P = naturalness, Q = facility

The results of evaluating the potential of tourism areas in a social manner are carried out by looking at the designation of the area, community, and tourists that are found. The results of the evaluation show that the Malalayang Beach area and Boulevard Area have the highest value on a scale of 5. This is influenced by the designation of the area where the area has been managed and entered in urban areas and there are many tourists (Table 8).

**TABLE VIII. RESULTS OF EVALUATION OF THE POTENTIAL OF SOCIAL TOURISM AREAS**

Areas	Scales				
	1	2	3	4	5
Pulau Bunaken				CDE	
Pulau Siladen				CDE	
Pulau Manado Tua				CDE	
Kawasan Pantai Malalayang					CDE
Kawasan Boulevard					CDE
Hutan Mangrove Tongkaina				CDE	
Gunung Tumpa				CDE	

Description: C = Area designation, D = Community E = tourists found

- 1 = Dense forest, no, less
- 2 = Production forest, some local residents, often visited by tourists
- 3 = Areas that have been managed, often found by the community, often visited by tourists
- 4 = The area has been managed, the village, there is
- 5 = The area has been managed, the city, there is

Furthermore, the evaluation of the potential for managerial tourism areas where the Boulevard Area has a very good value is on a scale of 5. This is influenced by service facilities that are managed professionally, there is an entrance fee and there is control from the manager. The Gunung Tumpa area is included on a scale of 5, which is very good for service facilities and managerial control, while the Malalayang Beach area is on a scale of 5 for the availability of service facilities (Table 9).

**TABLE IX. RESULTS OF EVALUATION OF THE POTENTIAL OF TOURISM AREAS IN A MANAGERIAL MANNER**

Areas	Scales				
	1	2	3	4	5
Pulau Bunaken					HIJ
Pulau Siladen					HIJ
Pulau Manado Tua					HIJ
Kawasan Pantai Malalayang				J	H
Kawasan Boulevard					HIJ
Hutan Mangrove Tongkaina				HIJ	
Gunung Tumpa					HIJ

Description: H = Service facility, I = Entrance fee, J = Management control

- 1 = none, none, uncontrolled
- 2 = exist, none, uncontrolled
- 3 = traditionally, nothing, uncontrolled
- 4 = traditionally, depends on tourists, is not controlled
- 5 = professional, determined, good

Based on the micro-ROS method (Table 10) the tourist area of Manado City is made zoning area which includes the Zone area of Bunaken Island (A), the zone of Siladen Island Region (B), the zone of Manado Tua Island (C), the Malalayang Beach Zone (D), Zone of Boulevard area (E), Mangrove Forest Zone of Bahowo Tongkaina (F), and zone of Gunung Tumpa Forest Area (G).

**TABLE X. ZONA AREAS AND TOURISM ACTIVITY OPPORTUNITIES**

No	Zone Area	Tourism Opportunities
1	Zone A	Tourism activities that can be carried out include snorkeling, diving, underwater photography, and for tourists who want to enjoy the beauty of the underwater panorama but cannot swim, they can enjoy it by using a glass boat (catamaran).
2	Zone B	Tourism activities that can be carried out in this area are, in the form of snorkeling, diving, underwater photography, and for tourists who want to enjoy the beauty of the underwater panorama but can not swim can enjoy it by using a glass boat (catamaran). This activity can be carried out at two dive points namely Siladen one and Siladen two.
3	Zone C	Tourists who like of hiking can visit this area. The peak of Manado Tua Mountain is a protected forest, which is rich in various types of flora (coconut, palm, sago, silar, and woka), and fauna (Sulawesi black monkey "yaki" and cuscus). In addition, in Tanjung Raja there is a Portuguese anchor ship anchor, while in Tanjung Kopi there is the nesting place for Tuteuruga (Turtle) on the full moon so that it has its own charm.
4	Zone D	Tourism activities that can be done on Malalayang beach are culinary tours, sunbathing, swimming, enjoying the views of Bunaken Island, Manado Tua and Siladen, as well as sports and boating.
5	Zone E	Enjoying the beauty of the beach, fishing, snorkeling, diving, canoeing, enjoying culinary tours, shopping, cycling, and enjoying the beauty of Manado City.
6	Zone F	Enjoying the beauty of mangrove forest, snorkeling, diving, canoeing, fishing, bathing, enjoying typical food such as rica-rica grilled fish with sambal dabu-dabu lilang, fried banana with sambal roa, gohu, enjoying the beauty by using a raft.
7	Zone G	Enjoying the beauty of the beach with a variety of views of Bunaken, Siladen and Manado Tua Island, the beauty of forests and plantations, local culture, and enjoying the views of the people in farming.

The assessment of the potential of Objects and Attraction (ODTW) in Manado City as well as the socio-cultural and economic potentials are discussed in three categories of

tourism objects, namely: coastal tourism objects, sea-shaped tourist objects, and land-shaped tourism objects (Table 11-13).

**TABLE XI. ASSASMENT POTENTIAL OF ODTW BEACH**

No	Zone	Beauty	Coast Security	Sand	Difference of activity	Cleanness	Coastal Width	Comforting
1	D	4	5	1	4	4	5	4
2	E	4	5	1	4	4	5	4

**TABLE XII. ASSASMENT POTENTIAL OF MARINE ODTW**

No	Zones	Beauty	Diversity	Uniqueness and Beauty	Stability	Cleanness	Several of Same Point	Comforting	Not Interference
1	A	5	5	5	5	5	4	4	5
2	B	5	5	4	5	5	4	4	5
3	C	5	5	4	5	5	4	4	5
4	F	5	5	5	5	5	4	4	5

**TABLE XIII. ASSASMENT POTENTIAL ON SHORE ODTW**

No	Zones	Beauty	Uniqueness	Manny Potential	Stability SDA	Sensitivity SDA	Types of Nature Tourism Activities	Air Cleanliness and Location	Regional Insecurity
1	C	5	2	3	3	3	4	4	5
2	G	5	2	3	3	3	4	4	5

Furthermore, assessment of the socio-cultural and economic potential assessment criteria used are socio-economic environmental conditions, community services, accessibility, accommodation, facilities and infrastructure,

availability of clean water, object relations with other tourist objects, climatic and security conditions. Value 5 shows very good, value 4 is good, value 3 is moderate, value 2 is less, and value 1 is very lacking (Table 14).

**TABLE XIV. ASSASMENT OF SOCIAL CULTURAL AND ECONOMIC POTENTIAL**

No	Zone	Sosek Environmental Conditions	Society service	Access	Accommodation	Infrastructure	Clean water	Object Relations	Climate Conditions	Security
1	A	5	4	5	5	5	5	5	5	5
2	B	5	4	5	5	5	5	5	5	5
3	C	5	4	5	5	5	5	5	5	5
4	D	5	4	5	5	5	5	5	5	5
5	E	5	5	5	5	5	5	5	5	5
6	F	5	4	5	5	5	5	5	5	5
7	G	5	4	5	5	5	5	5	5	5

Based on the table above it can be seen that the socio-cultural and economic conditions of all zones fall into the "very good" category with a total value of 4.90. Furthermore, for the assessment of the natural tourism potential of the beach is included in the category of "good" with a total value of 3.86, marine tourism potential is in the "good" category with a total value of 4.30. The highest value of all ODTW potential assessments is land natural tourism potential which is in the "very good" category with a total value of 4.99.

#### IV. CONCLUSION

With the model Micro-ROS (Recreation Opportunity Spectrum) where small tourist areas with large tourist areas are considered equally important in providing tourism

opportunities. With the enforced Micro-ROS model then the spike in the number of tourist visits will not be worrying because of the large selection of objects and attractions offered.

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