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The Analysis of Environmental Support in the Development Tourism at Nipa-Nipa Great Forest Park

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ABSTRACT: Nipa-Nipa Great Forest Park (Tahura Nipa-Nipa) at Kendari city, known as a conservation area, offers a variety of object has tourist attraction in the form of flora and fauna diversity, beautiful natural phenomenon, cultural objects, history and the unique life of local communities. The natural attractions in Nipa-Nipa Great Forest Park have been visited by many tourists. Based on the existing potential and the number of tourists visit in Nipa-Nipa Great Forest Park, it is necessary to develop natural tourism. This is improving the function of natural tourism services in meeting the increasing demand for natural tourism. An important aspect in tourism development is the aspect of environmental carrying capacity. The aim of this research is to analyze the carrying capacity of the tourism environment in the Nipa-Nipa Great Forest Park area through the Effective Carrying Capacity (ECC) in supporting the development of natural tourism in Kendari city. This research was used a qualitative approach. The research data consisted of secondary data (document search) and primary data obtained in the field. Data obtained by survey techniques, observation and literature study. Analysis of the carrying capacity of the environments using the equation ECC = RCC x MC. The result of the analysis was showed that the carrying capacity of the natural tourism environment of Nipa-Nipa Great Forest Park about 220 people per day per three hours. This mean that the maximum tourist capacity without causing environmental damage is 220 people per day per three hours. When it exceeds the capacity, it will have a negative impact on the tourism environment and tourism managers can take action to temporarily close the location to avoid over capacity. The conclusion of research: based on the maximum amount of visiting areas, the development of Nipa-Nipa Great Forest Park as natural tourism is very potential to be developed, because the average tourist visit per day in the Nipa-Nipa Great Forest Park area around 2 people, which is smaller than the maximum capacity in natural attractions at The Nipa-Nipa Great Forest Park about 220 people per day.

Keywords: Kendari, Nipa-Nipa Great Forest Park, natural tourism, carrying capacity.

I. INTRODUCTION

Tourism is one of the sectors as the main driver of the world economy because there are several advantages able to provide substantial foreign exchange for the country, expand employment and introduce the country's culture [1]. Anup *et al.,* [2] tourism sector playing an important role in contributing 9% of the total Gross Domestic Product worldwide. Then, state that tourism was used as an engine of economic growth and is considered a source of income and job creation [3].

Indonesia is one of the countries has abundant wealth in the tourism business, making the main sector of economic development [4]. In 2019, the number of foreign tourist arrivals to Indonesia was 6.28 million people [5]. Various attempts have been made by the Government to increase the number of tourist visits. This continues to be done to find new tourist destinations or develop tourism potential in Indonesia.

The natural tourism meaning all of activities based natural condition. In the other hand, the natural tourism has strong related to the ecosystem that supported increasing value of the target areas [6-8]. The natural tourism forming activities in the mountain, forest, caves, valley, river, coast, sea, waterfall, lake and canyon [9, 10] or artificial natural tourism such as: rice field, mixed agricultural land, plantation, cultural heritage, art performances, religious buildings and other physical forms that are attractive to visit. One form of natural tourism activity that is currently developing is ecotourism.

According to [10, 11] state that ecotourism defined as a form of tourism that is responsible for the preservation of an unspoiled area (natural area), provides economic benefits and maintain cultural integrity for the community. In general, [12-15] argues ecotourism is an effort to integrate conservation, community and travel in a sustainable manner. Ecotourism is a trip to an unspoiled area, carried out by tourists in a responsible manner to conserve the environment, support the sustainability of the welfare of local communities, is a stage of interpretation and education or learning for parties involved in ecotourism activities, such as managers, communities and tourists.

Canteiro *et al.,* [16], states that conservation areas in the form of natural conservation areas or natural reserves or protected forest areas are destinations that attract tourists to visit, because they have a diversity of flora and fauna, beautiful natural phenomena, cultural objects, history and the unique life of local communities, so that tourism potential is large enough to be developed. The existence of this potential can support ecotourism activities.

The carrying capacity of the environment is a very vital aspect in developing tourist areas. The carrying capacity of the environment is considered as an inherent part of the ecosystem that naturally limits human exploitation activities, to enable how to achieve a sustainable level of use of natural resources [17].

Guerrero *et al.,* [18] reported that a carrying capacity analysis aims to determine the ability of an area to receive tourists with maximum use intensity of natural resources that continues without damaging the

environment. The carrying capacity of the environment is the maximum capacity and capability of the environment to support an organism and other organisms to grow and develop [18-20]. The tourism capacity of an area is influenced by the conditions and characteristics of the resources available in an area. Therefore, the environmental resources available to a biological population are limited according to the maximum number of sustainable organisms in an area [21]. Generally, the assessment of the carrying capacity of the environment uses the effective carrying capacity (ECC) approach, which is the optimum capacity of tourists that can be accommodated using the equation ECC = RCC x MC. Analysis of Effective Carrying Capacity (ECC) is carried out based on supporting data, including: the average number of tourists visiting, the area of the tourism area, the carrying capacity index according to the criteria of landscape, topography, length of tourism services and the number of managers that comply with operational standards [9, 10].

The carrying capacity of the environment has a definition as the capacity of the number of tourists that can be accepted by a tourist location without any negative changes in the environment [10, 21, 22]. The carrying capacity of a tourist area is defined as the level of tourist presence which has an impact on the local community, environment, and economy which can still be tolerated by both the community and tourists and provides assurance of sustainability in the future [23]. The carrying capacity of the environment is the point where the population of an area reaches its limit under certain conditions when the use of resources is satisfactory and most efficient under a stable human-earth relationship system. This system includes three parts, namely: resource support capacity, environmental capacity and capacity to withstand disaster-risks [24, 25].

According to Gilbert, (2003), carrying capacity analysis aims to determine the extent to which the area's ability to receive a number of tourists with maximum use intensity of natural resources that takes place continuously without damaging the environment. According to [25, 26] Argued that the determination of the carrying capacity needs to be considered ecologically and socioeconomic and culture of the local community. The development of a tourist area is closely related to the accommodation, transportation, and means of communication, services and recreational facilities that are built. The physical carrying capacity is the maximum amount of use of a resource or ecosystem that can be adopted by an area or zone without causing damage or degradation of physical quality. This means that the analysis of the carrying capacity of the environment in tourist areas refers to the limited capacity of the region and the environment in supporting tourism activities. At a certain time when environmental conditions have been overloaded, there is an imbalance in the carrying capacity which causes environmental damage. Tourism and the environment are two things that are interconnected [27] especially tourism in conservation forest areas because conservation forests have a vital role in people's lives [27]. This growth causes changes in the environment [29]. Naturally of the environment has the ability to restore its state.

Restoration of the environmental carrying capacity of a tourist area is an action that must be taken. Therefore, it is necessary to set a standard for the carrying capacity of the tourism environment, especially in the Nipa-Nipa Great Forest Park, the conservation area located in Kendari city and Konawe Regency. The potential of environmental carrying capacity can be identified in accommodating the number of tourists visiting and the construction of several tourism facilities and infrastructure is carried out. It is hoped that this can increase the carrying capacity of the environment towards the condition of the forest as a whole and the condition of the tourist attraction area itself. Beside as conservation areas, Nipa-Nipa Great Forest Park offers a variety of tourist attractions that interesting for visitor [30].

Based on the available potential and the number of tourist visits in Nipa-Nipa great Forest Park, it is very necessary to develop natural tourism to improve the function of natural tourism services in meeting demand for natural tourism which tends to increase and has an impact on improving the economy of the community and the Government (Southeast Sulawesi Province and Kendari city) as well as the environment of the Nipa-Nipa Great Forest Park areas.

As one of the natural tourist object destination in Sulawesi, the management office of Nipa-Nipa Great Forest Park playing important roles as the agency responsible for managing the area has not been able to realize international standard tourism conditions due to various inhibiting factors, including: unfavorable external factors and internal socio-cultural factors, the level of object exploitation, availability and quality of supporting facilities, investor participation and others that are not yet optimal, thus affecting the low activity of tourism activities. Efforts are needed to develop tourism in the Nipa-Nipa Great Forest Park in the form of revitalizing all series of programs related to an integrated approach to organizing activities.

The aim of this research is to analyze the carrying capacity of the tourism environment in the Nipa-Nipa Great Forest Park through the Effective Carrying Capacity (ECC) in supporting the development of natural tourism in Kendari city.

II. MATERIALS AND METHODS

A. Site of Research

The object of research is area of Nipa-Nipa Great Forest Park, Kendari city, Southeast Sulawesi Province, Indonesia (Fig. 1). The tools used in this research: questionnaire, altimeter, Tally Sheet, GPS and computer equipped with Microsoft Excel and Arc Gis software. 10.3. This research used a qualitative approach.

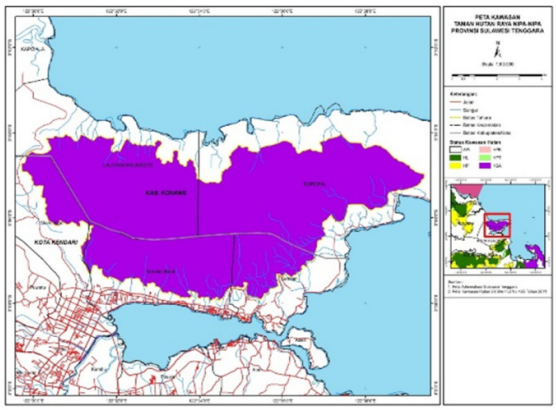

Fig. 1. Nipa-Nipa Great Forest Park in Kendari, Southeast Sulawesi.

B. Procedure of Data

Types of research data consist of secondary data and primary data. Primary data are: coordinate points of tourist objects (ground check), the condition of the object's landscape, slopes and data on public perceptions related to infrastructure, equipment and personnel. Secondary data includes: information on the number of visitors and literature related to environmental carrying capacity assessment.

Data on the potential for tourist areas at the location of tourist objects are measured directly to find out the area of the tourist attraction area which is then calculated using the formula for the carrying capacity of the environment with the equation [10, 31, 32].

ECC = RCC × MC

ECC : *Effective Carrying Capacity*, is the optimum number of tourists that can be accommodated based on the manager's consideration.

RCC : *Real Carrying Capacity,* the maximum number of tourists allowed to visit is in accordance with the physical carrying capacity of the tour.

MC : *Management Capacity,* is the number of tour management officers.

$RCC = PCC - Cf^1 \times Cf_2 \ldots Cf_n$

CF_1 : Assessment Coefficient

$$PCC = A \frac{I}{B} x\ Rf$$

A : Tourism area

B : The needed a tourist area for recreation

Rf : Tour opening hours / length of visit (per three hours)

PCC : Physical Carrying Capacity

$$MC = \frac{Rn}{Rt} x 100\%$$

Rn : The number of officers available

Rt : The number of officers required

The assessment of the tourism area criteria index was showed in Table 1.

Table 1: Assessment of Landscape Index/Criteria in the Tourism Area.

Variable	Criteria	Score
Topography	a. Not hilly, low and choppy hills	1
	b. Steep slopes	3
	c. Very steep with vertical relief	5
Vegetation	a. Little or no vegetation difference (tends to be uniform)	1
	b. There is some vegetation and only 1-2 species are dominant	3
	c. Colors vary from various types, patterns, structures and attractive shapes	5
Landscape Color Variations	a. The color variations are subtle and contrasting and are generally muted	1
	b. There are types of color, there is contradiction of soil, rock and vegetation but not the dominant scene	3
	c. The color combination of various types and contrasts beautifully and the color of soil, rock and water vegetation and more	5
Scenery	a. The view nearby has little / no effect on the scenery	0
	b. The view nearby has quite an effect on the quality of the scene	3
	c. The scenery nearby greatly affects the quality of the tourist scene	5
Natural Background	a. Has an interesting background but is almost the same as the general situation in an are	1
	b. Typical although almost the same as certain areas	3
	c. An area that is unique / different from other objects so that it creates an attractive impression	5
Modification/Natural Changes	a. Modification adds variety but goes against nature and creates disharmony	-4
	b. The modifications add little or no diversity to the scene	0
	c. he construction of facilities such as electrical installations, water, houses provides modifications that can increase visual diversity, and/or there is no modification	2
Total		27
Landscape Potential Index (Total Score/Number of Criteria)		

III. RESULTS AND DISCUSSION

A. Tourist Visit in the Nipa-Nipa Great Forest Park

The form of tourism based on ecological sustainability or ecotourism is considered very profitable at this time. In addition to maintaining the existing environment, it also maintains the culture of the surrounding community [33]. Ecotourism activities cannot be separated from the limitation of the number of visitors so that the potential of ecotourism resources can be utilized in a sustainable manner. In general, the responsibility for managing tourist attractions is left to the management office of Nipa-Nipa Great Forest Park which is stipulated based on the Regulation of the Governor of Southeast Sulawesi Province Number 16 year 2008. The number of visitors is shown in Fig. 2.

Based on the data, it is known that the average number of visitor in the last three years was 884 people. This data showed the number of tourist visit in the Nipa-Nipa Great Forest Park has increased every year with an average value of 1.7% per year.

The increasing number of visitor that continue to increase as the potential to affect the tourist environment and damage the ecosystem. The calculation of the carrying capacity of the environment is needed to determine the capacity and threshold for tourist visits to tourist objects.

The location of Natural Tourism Objects in the Nipa-Nipa Great Forest Park was showed in Fig. 3.

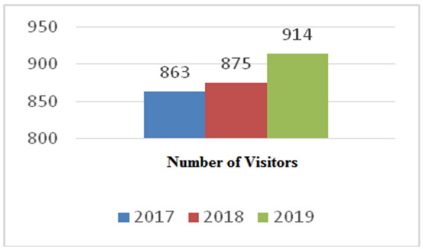

Fig. 2. Number of Visitors in the Last Three Years (2017- 2019 period).

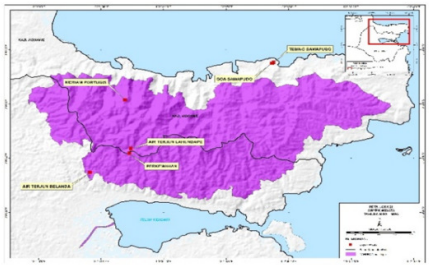

Fig. 3. Location of Natural Tourism Objects in the Nipa-Nipa Great Forest Park.

B. Environmental Carrying Capacity (ECC)

Each natural tourism area can have a different carrying capacity for each type of tourism activity [34]. The carrying capacity of the environment can be developed and modified in three components, namely: ecological, social and economic, taking into account the capacity of infrastructure and management of various types of tourism activities [4].

The aspect of environmental carrying capacity in this study is the biophysical component of tourism objects including the number of tourists, the area of tourist objects, the landscape, and the slope of the Nipa-Nipa Great Forest Park as natural tourism object. The carrying capacity assessment aims to determine the value of the carrying capacity of the environment for the number of tourist visits (in a certain period) so as not to cause damage to the ecosystem and the surrounding environment. This carrying capacity analysis is needed in planning the development of natural tourism. This is done as the basis for sustainable natural based tourism management. Tourism activities that are developed need to be adjusted to the conditions of natural resources and their uses [34].

(i) Physical Carrying Capacity (PCC): The meaning of Physical Carrying Capacity (PCC) is the maximum number of tourists who are physically fulfilled by the space provided at a certain time. The physical supporting capacity of natural tourism in the Nipa-Nipa Great Forest Park was showed in Table 2.

Based on the results of the PCC calculation, it can be seen that the number of tourists who can physically be accepted in the tourist area of Nipa-Nipa Great Forest Park every day is 361 people per day. This number is famous in each of the natural attractions in the Nipa-Nipa Great Forest Park.

(ii) Real Carrying Capacity (RCC): To measure the RCC, the coefficient value or correction factor (Cf) is calculated. The index factor in the study used two variables, namely landscape (topography, vegetation and landscape or natural background) as Cf1 and slope as Cf_2. The results showed that the value of the natural tourism carrying capacity of Nipa-Nipa Great Forest Park according to the landscape criteria for each natural tourism object can be seen in Table 3.

Furthermore, the assessment of the second correction factor is slope (Cf_2). This variable is also an assessment of the potential or vulnerability to erosion and landslides in the natural tourism area of Nipa-Nipa Great Forest Park. In accordance with the results of the analysis of the height, it is found that the natural tourism objects in the Nipa-Nipa Great Forest Park at an average slope between 15-25%. The slope value of each natural tourist attraction can be seen in Table 4.

Table 2: Physical Supporting Capacity of Natural Tourism Areas in the Nipa-Nipa Great Forest Park.

Natural Tourist Attraction	Area (m^2)	PCC (Visitor/Day)
Lahundape Wataerfall (LWF)	500	37
Amarilis Peak (AP)	4.000	297
Belanda Waterfall (BWF)	100	7
Sawapudo Cave (SCV)	100	7
Sawapudo Cliff (SCL)	140	10
Portuguese Cannon (PC)	40	3
Total	4.880	361

Table 3: Environmental Carrying Capacity Index by Landscape (Cf_1) of Natural Tourism Objects in the Nipa-Nipa Great Forest Park.

Variable	Score Value					
	LWF	AP	BWF	SCV	SCL	PC
A. Landscape (Cf_1)						
1. Topography	3	3	3	1	5	5
2. Vegetation	5	1	5	1	3	5
3. Landscape color variations	5	3	3	1	5	3
4. Scenery	5	3	0	0	5	5
5. Natural background	1	1	1	5	5	1
6. Modification / change of nature	-	-	-	-	-	-
Total	19	11	12	8	23	19
Landscape Value (Cf_1)	1,27	0,73	0,80	0,53	1,53	1,27
B. Desolation (Cf_2)	60	60	60	60	80	60

Table 4: Slope value of natural tourism objects in the Nipa-Nipa Great Forest Park.

Natural Tourist Attraction	Slope Class Classification (%)	Score Value
Lahundape Wataerfall (LWF)	15-25	60
Amarilis Peak (AP)	15-25	60
Belanda Waterfall (BWF)	15-25	60
Sawapudo Cave (SCV)	15-25	60
Sawapudo Cliff (SCL)	25-45	80
Portuguese Cannon (PC)	15-25	60

Based on the assessment of the landscape and slope indices, the correction factor values (Cf1 and Cf2) are obtained as presented in Table 5.

The Real Carrying Capacity (RCC) value of natural tourism objects in the Nipa-Nipa Great Forest Park area can be obtained. The analysis result of Nipa-Nipa Great Forest Park presented in Table 6.

(ii) Effective Carrying Capacity (ECC): The Effective Carrying Capacity (ECC) is the calculation of the percentage of the number of managing officers. This analysis is carried out by considering the factors of the physical carrying capacity of the tourist area and the number of visitors through the MC (Management Capacity) equation. The number of natural tourism management resources in Nipa-Nipa Great Forest Park currently is all employees at the management office Nipa-Nipa Great Forest Park, Forestry Service of Southeast Sulawesi Province. Based on the data obtained, the number of Nipa-Nipa Great Forest Park employees is 17 people (reduced by 10% to 2 people). As many as 15 people are suspected of not being active in ecotourism management.

In order for the area to be managed properly, the area must have a minimum of 26 employees including managers, administration, security, drivers and other employees [25]. Thus, an additional 11 ecotourism managers are needed then MC value = 1.54%. Based on the RCC and MC values, it can be seen that the ECC (Effective Carrying Capacity) value is the optimum number of tourists that can be accommodated based on the manager's considerations in the natural tourism of Nipa-Nipa Great Forest Park, which is presented in Table 7.

Table 5: Value of Correction Factors Cf1 and Cf2 Natural Tourism Objects in the Nipa-Nipa Great Forest Park.

Variable	Factor Koreksi (100-Cf_n/100)					
	LWF	AP	BWF	SCV	SCL	PC
(Cf_1)	0,99	0,99	0,99	0,99	0,98	0,99
(Cf_2)	0,40	0,40	0,40	0,40	0,20	0,40

Table 6: RCC Analysis Result on Natural Tourism Objects in the Nipa-Nipa Great Forest Park.

Natural Tourist Attraction	PCC	Cf_1	Cf_2	RCC (Visitor/Day)
Lahundape Wataerfall (LWF)	37	0,99	0,40	15
Amarilis Peak (AP)	297	0,99	0,40	118
Belanda Waterfall (BWF)	7	0,99	0,40	3
Sawapudo Cave (SCV)	7	0,99	0,40	3
Sawapudo Cliff (SCL)	10	0,98	0,20	2
Portuguese Cannon (PC)	3	0,99	0,40	1

Table 7: Result of ECC Analysis at the Nipa-Nipa Great Forest Park as Natural Tourism Object.

Natural Tourist Attraction	RCC	MC	ECC (person/day)
Lahundape Wataerfall (LWF)	15	1,54	23
Amarilis Peak (AP)	118	1,54	182
Belanda Waterfall (BWF)	3	1,54	5
Sawapudo Cave (SCV)	3	1,54	5
Sawapudo Cliff (SCL)	2	1,54	3
Portuguese Cannon (PC)	1	1,54	2
Total			220

LW = Lahundape Waterfall; AP = Amarilis Peak; BW = Belanda Waterfall; SCV = Sawapudo Cave; SCL = Sawapudo Cliff; PC = Portuguese Cannon.

Based on the results of the analysis of the Effective Carrying Capacity (ECC) of natural tourism in Nipa-Nipa Great Forest Park, there are as many as 220 people per day which spread across all natural tourism objects in the Nipa-Nipa Great Forest Park, namely: Lahundape Waterfall (LW) as many as 23 people per day, natural attractions Amarilis Peak (AP) as many as 182 people per day, Netherlands Waterfall (BW) as many as 5 people per day, Sawapudo Cave (SCV) as many as 5 people per day, Sawapudo Cliff (SCL) as many as 3 people per day and Portuguese Cannon (PC) 2 people per day. Thus, for each tourist attraction the number of visitors will be limited with the aim of maintaining environmental conditions caused damage to the tourist environment.

Judging from the average length of time to open the tour is 14.5 hours with an average length of visit of three hours [23], then the Effective Carrying Capacity (ECC) of natural tourism in the Nipa-Nipa Great Forest Park area is 220 people every three hours. This means that the maximum tourist capacity without causing environmental damage in the natural tourism area of Nipa-Nipa Great Forest Park is 220 people every three hours according to the area's size. This explains that the excess power capacity has a negative impact on the tourism environment. In general damages other ecosystems in Nipa-Nipa Great Forest Park.

Based on the value of the Effective Carrying Capacity (ECC), when the number of tourists reaches 220 people, the tour manager can take action to temporarily close the location. This is done to avoid over capacity which causes inconvenience for tourists [24] including the disturbance of the ecosystem in the Nipa-Nipa Great Forest Park. Estimating the carrying capacity of the environment and setting up restrictions on visitor access are common approaches in maximizing the use of resources to avoid environmental degradation [36]. It is a solution to find a balance between conservation and sustainable use of recreation and the environmental resources in the area.

The average number of tourist visits in Nipa-Nipa Great Forest Park is around 884 people per year (2 people per day). Based on this number, it looks smaller than the value of the tourism carrying capacity of 220 people per day so that efforts can be made to develop natural tourism in the Nipa-Nipa Great Forest Park while still paying attention to tourism capacity so that the carrying capacity of the environment can be maintained to

ensure aspects of sustainable natural tourism development [16]. Identifying the carrying capacity of a tourism destination is very important to ensure that the number of visitors does not exceed a certain threshold beyond which environmental resources will deteriorate excessively.

Tourism and the environment are two things that are interconnected especially in tourism in conservation forest areas [32], as it is known that conservation forests have a vital role in people's lives. This growth causes changes in the environment [33, 43]. The environment naturally has the ability to restore its state. The recovery of this state is a principle that in fact this environment is always wise to maintain its balance. As long as there has been no forced disturbance, whatever happens, the environment itself will react in a balanced manner.

C. Tourism Development Potential

The potential for developing the Nipa-Nipa Great Forest Park as natural tourism in this study is based on the value of the carrying capacity of the tourism environment in accommodating the maximum number of tourists (ECC). According to the average number of tourist visit in Nipa-Nipa Great Forest Park, around 884 people/year are obtained. From this number, it means that the average number of tourist visiting each month is around 74 people or about 2 people per day.

Based the number of tourist visits in each day (2 people), it means that this number is relatively small compared to the value of the respective carrying capacity of the Nipa-Nipa Great Forest Park natural tourism object. Thus, the development of natural tourism in each of the natural attractions in Nipa-Nipa Great Forest Park has the potential or potential for development. This is accommodate the number of visits according to the carrying capacity of each of the Nipa-Nipa Great Forest Park natural attractions. If tourism development is not carried out, it will be inconvenient for visitor to come back to visit [34, 35]. Development that is carried out optimally and based on environmental carrying capacity is the best strategy for the process of preventing environmental damage [37].

It is very important to develop tourism in Nipa-Nipa Great Forest Park while paying attention to environmental conditions, where an increase in the number of tourist visits will have an environmental impact and especially in conservation areas that are declared to protect biological and environmental values, this solution can be found to find a balance between the preservation and the sustainable use of recreation and the environmental resources in the area

IV. CONCLUSION AND SUGGESTION

The finding of research is:

1. The management and related government need to formulate the development of Nipa-Nipa Great Forest Park as natural tourism can increase tourist attractiveness and the number of visits while maintaining the original landscape of tourism which in turn can provide both economic and socio-cultural benefits;
2. It is necessary to carry out further research on landscape-based natural tourism development planning so as to increase interest and the number of tourist visits while maintaining environmental sustainability.

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