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Ecological carrying capacity of Cidahu Nature Tourism Object, Gunung Halimun Salak National Park

KOKO KOMARUDIN[1,2,*], ROSADI[2], SATA YOSHIDA SRIE RAHAYU[2]

[1]Gunung Halimun Salak National Park Agency, Ministry of Environment and Forestry of the Republik of Indonesia, Jln. Cipanas, Kecamatan Kabandungan, Kabupaten Sukabumi 43368, Indonesia

[2]Environment Management Study Programme, Graduate School, Pakuan University, Jln. Pakuan Kotak Pos 452, Bogor 16129, Indonesia

Corresponding author: *kokoalashalimun@yahoo.co.id*

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ABSTRACT

The nature tourism sector plays an important role in national economic growth. Cidahu Nature Tourism Object, Gunung Halimun Salak National Park (GHSNP) is one of the natural attractions that has provided many benefits for the government, especially in supporting local community's economy. Natural tourism activities in Cidahu, which have been tended for mass tourism, can both benefit the economy and have a negative impact on conservation areas. The purpose of this study was to determine the tourism carrying capacity in Cidahu Nature Tourism Object by examining the maximum number of tourists that can be accommodated so that the physical, environmental and management aspects are not damaged ecologically and tourism actors may still receive satisfaction from the activities. Through a descriptive research method, data processing techniques using the Cifuentes method was used to calculate the physical carrying capacity (PCC), real carrying capacity (RCC) and effective carrying capacity (ECC). Based on the results of the study, the physical carrying capacity value was 10,593, the real carrying capacity was 148 and the effective carrying capacity was 133. With the PCC value > RCC > ECC, the tourism carrying capacity in Cidahu Natural Tourism Object is still in good condition.

ABSTRAK

Sektor pariwisata alam memegang peranan penting dalam pertumbuhan ekonomi nasional. Obyek Wisata Alam Cidahu, Taman Nasional Gunung Halimun Salak (TNGHS) merupakan salah satu obyek wisata alam yang telah memberikan banyak manfaat bagi pemerintah khususnya dalam menunjang perekonomian masyarakat setempat. Kegiatan wisata alam di Cidahu yang selama ini cenderung bersifat mass tourism dapat memberikan manfaat ekonomi dan juga berdampak negatif bagi kawasan konservasi. Tujuan dari penelitian ini adalah untuk mengetahui daya dukung pariwisata di Obyek Wisata Alam Cidahu dengan mengkaji jumlah maksimal wisatawan yang dapat ditampung sehingga aspek fisik, lingkungan dan pengelolaan tidak rusak secara ekologis dan pelaku pariwisata tetap dapat memperoleh kepuasan dari kegiatan. Melalui metode penelitian deskriptif, teknik pengolahan data menggunakan metode Cifuentes, digunakan untuk menghitung daya dukung fisik (PCC), daya dukung nyata (RCC) dan daya dukung efektif (ECC). Berdasarkan hasil kajian nilai daya dukung fisik sebesar 10.593, daya dukung riil sebesar 148 dan daya dukung efektif sebesar 133. Dengan nilai PCC > RCC > ECC maka daya dukung wisata di Obyek Wisata Alam Cidahu masih dalam kondisi baik.

Keywords: *carrying capacity, Cidahu, ecological, national park, nature tourism, Sukabumi*

INTRODUCTION

Nature tourism is a type of tourism activity that utilizes the potential of natural resources and environmental management (Suwantoro, 2004). Nowadays, tourism activities in conservation areas tend to increase alongside an increasing awareness about nature conservation (Pickering & Hill, 2007). Conservation areas are expected to contribute to economic development and reduce poverty. As an attraction for tourists and managers, conservation area-based tourism activities can both be a challenge and a significant opportunity. A lack of proper planning and management will contribute to significant negative impacts on the ecosystem environment in the area and its surroundings, and also on the lives of its people (Sheppard, 2006).

In general, there are two types of nature tourism activities in conservation areas: (1) a small scale or special interest (ecotourism) activity that may only have a small impact on the ecosystem, and (2) a large scale/mass tourism activity that involves many components and will have a large impact on the ecosystem (McCool & Moisey, 2008). The trend of ecotourism internationally is indeed increasing, but economically, mass tourism with a large and continuous number of tourists is seen as more profitable than ecotourism with a small and uncertain number of tourists (Fandeli & Nurdin, 2005).

Gunung Halimun Salak National Park (GHSNP) has been used for nature tourism activities. The GHSNP area is located within three local government administrative areas, namely Sukabumi Regency, Bogor Regency and Lebak Regency. In the Sukabumi Regency,

GHSNP has been in great demand as a natural tourist destination by domestic and foreign tourists. GHSNP is a tourist hotspot due to its beautiful natural scenery, cool air, and relatively short distance from the Greater Area of Jakarta (TNGHS, 2018).

Cidahu Nature Tourism Object, located at geographical coordinates of 106°43'8.9"E – 6°45'5.50"S, is one of the natural attractions in the GHSNP. Administratively, Cidahu Nature Tourism Object is in Cidahu Village, Cidahu District, Sukabumi Regency, West Java Province. Cidahu Nature Tourism Object is located at an altitude of 953 meters above sea level at the foot of Mount Salak. This location offers the scenaries of the beauty of natural mountain with a lot of camping grounds by the stream and waterfalls.

Its hilly topography is dominated by damar (*Agathis dammara*) trees, some of which are more than 40 years old. There are 4 (four) blocks of camping grounds, namely Block-1, Block-2, Block-3, and Block Cek Dam camping grounds. In addition to the *Agathis dammara* forest, another interesting tourist attraction is a waterfall (or its locally called *curug*) with five waterfalls, namely Curug-2 Undak, Curug-4, Curug Taraje, Curug Buleud and Curug Sawer. In terms of tourism infrastructure, there is a gate, ticket post, management office, visitor center, prayer room, toilet, shelter, wooden dack, tourist track and bridge. Apart from its tourism potential, the area is also rich in wildlife biodiversity, such as primates and birds. Primates coocurs in this area includes Javan gibbon (*Hylobates moloch*) and surili (*Presbytis comata*). Other interesting bird species to observe include the Javan eagle (*Nisaetus bartelsi*), snake eagle (*Spilornis cheela*), and black eagle (*Ictinaetus malayensis*) (TNGHS, 2018).

Cidahu Nature Tourism Object has a very high level of tourist arrivals as compared to other tourist locations within GHSNP such as the natural attractions of Curug Nangka and Sukamantri. The following graph shows the number of visitors to natural tourism objects in GHSNP (Figure 1).

As a main natural tourism attraction, Cidahu must maintain natural environment preservation. To make sure tourism activities and existing conservation activities can run well, it is necessary to know how many tourists the Cidahu Nature Tourism Object can accommodate. As mentioned by Sayan & Atik (2011) the Cifuentes method can be used to calculate the Physical Carrying Capacity (total area), Real Carrying Capacity (ecology) and Effective Carrying Capacity (managerial) to determine the carrying capacity of tourism. Determination of carrying capacity or the ability of the area to accommodate a number of tourists at a given time is important in nature tourism activities, because it involves environmental and regional sustainability. Based on this background, we wish to carry out an in-depth analysis on the carrying capacity of tourism in Cidahu Nature Tourism Object.

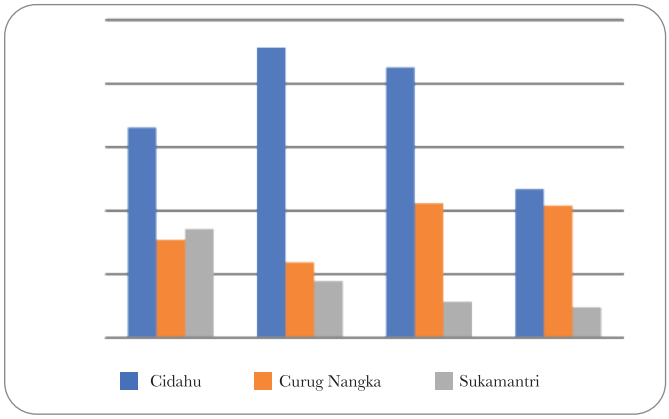

Figure 1. Number of tourists at some natural tourism objects within GHSNP between 2017 to 2020.

The research objectives for analysing tourism carrying capacity of Cidahu Nature Tourism Object as natural tourist attractions are 1) Analyzing the Physical Carrying Capacity of the Cidahu Nature Tourism Object, 2) Analyzing the Real Carrying Capacity of the Cidahu Nature Tourism Object, and 3) Analyzing the Effective Carrying Capacity of the Cidahu Nature Tourism Object.

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The environmental carrying capacity of natural tourism objects explores their ability to accommodate a number of tourists in a certain area and time unit (Soemarwoto, 2004). Further Soemarwoto (2004) argues that geobiophysical factors in natural tourism locations affect the strength or vulnerability of an ecosystem's carrying capacity. Tourism carrying capacity simlarly looks into the biogeophysical, socio-economic and

socio-cultural carrying capacity of a tourist location supporting tourism activities without reducing environmental quality and tourist satisfaction. In general, there are two aspects of carrying capacity in tourism, namely protecting resources and quality of travel experience (Sayan & Atik, 2011). Carrying capacity, in a general sense, relates to the amount and type of use that can be accepted by protected areas and related areas without causing negative impacts on the area and the quality of tourism (Manning, 2001). Cifuentes (1992) has developed an equation to calculate carrying capacity of a conservation area. The equation can be applied to determine the number of tourists that can be received optimally/effectively without causing damage to the conservation area. Carrying capacity of tourism can be determined through 3 factors, namely Physical Carrying Capacity (PCC), Real Carrying Capacity (RCC) and Effective Carrying Capacity (ECC). They can be examined using the method developed by Cifuentes, which has been recommended by the International Union for Conservation of Nature (IUCN) (Sayan & Atik, 2011).

METHODS

This research used a descriptive research method. Data collection techniques were conducted through observation, questionnaires, and documentation. To determine carrying capacity, we included (1) tourists who have visited Cidahu Nature Tourism Object, (2) biotic variables (tree vegetation and birds) and abiotic variables such as landscape potential, slopes, soil erosion sensitivity, dry month to wet month ratio, (3) key informants of the Cidahu Nature Tourism Object such as the Chairman of the Cooperative Wana Lestari, Head of village owned enterprise (BUMDES-*Badan Usaha Milik Desa*) Bangkit Sejahtera Cidahu Village and Section Head of GHSNP Sukabumi.

We used Garmin Global Positioning System (GPS) with GPSmap type 60CSx as a tool to measure the area of Cidahu's natural attractions and the Samsung Galaxy J 7 Core for taking pictures/photos. The clinometer was also used to measure the land slopes.

Research data obtained was processed and organized to ensure readability and interpretability (Azwar, 2012). The carrying capacity method proposed by Cifuentes in Sayan & Atik (2011) was used to analyze the processed data. The details of the analysis carried out are as follows.

Physical Carrying Capacity (PCC), which is the maximum number of tourists that can physically fulfill the space provided at a certain time (Sayan & Atik, 2011), is calculated using the following formula:

$$PCC = A \times \frac{V}{a} \times Rf$$

Notes:
A = Total area for tourism
V = Total area of visitors per m^2
a = The area required by a tourist to get satisfaction (0.009 Ha based on Douglas, 1975 cited in Fandeli & Nurdin (2009).
Rf = Rotation factors (open period/average of time spent in each visit)

Real Carrying Capacity (RCC), which is the number of visitors allowed to visit a tourist area, with a correction factor (Correction Factor /CF) based on the characteristics of the area that has been applied to the PCC (Sayan & Atik, 2011), is measured using the formula:

RCC = PCC - Cf1 - Cf2 - Cf3 – Cf4

Notes:
RCC = Real Carrying Capacity,
PCC = Physical Carrying Capacity,
Cf = Correction factors (The calculation of the correction factor for the diversity of flora and fauna in the Cidahu Nature Tourism Object uses the Simpson's equation: I-DS = 1 – ג)

Real Carrying Capacity shows the number of tourists that can be accommodated by a tourist area with various tourism activities without damaging the environment or ecosystem. The correction factors used in this study are:

a. Tree-level vegetation diversity
b. Diversity of bird species
c. Landscape potential index
d. Slope index
e. Soil sensitivity index to erosion
f. Precipitation index

Since the value of correction factor was in percentage, the calculation of RCC in percentage was done using this equation: RCC = PCC x (100-Cf1)/100 x (100 – Cf2)/100 x (100 – Cf3)/100 x (100 – Cf4)/100.

According to Sayan and Atik (2011), Effective Carrying Capacity (ECC) is the maximum number of visits where the area remains sustainable, with consideration to its Management Capacity (MC). The ECC shows the number of tourists that can be served optimally by the managements and tourism activities without damaging or with minimized damage to the ecosystem in the tourist area. ECC is calculated using the formula:

ECC = RCC x MC

Notes:
ECC: Effective Carrying Capacity
MC: Management Capacity
RCC: Real Carrying Capacity

In this research, MC is calculated using following equation:

MC = Total number of staff/Total number of staff needed x 100%

The tourism carrying capacity was determined by comparing data generated from the analysis of PCC, RCC and ECC. The provisions are PCC > RCC and RCC > ECC. The results of this analysis will be used as a standard in determining the carrying capacity of tourism in Cidahu Nature Tourism. If PCC > RCC > ECC, then the tourism carrying capacity in an area, in this case the Cidahu Nature Tourism, is good. This means that managers can still make efforts to increase the number of tourists to the limit of the calculated value from the equation above. However, if ECC is greater than RCC and RCC is greater than PCC, then the area has exceeded its maximum carrying capacity.

RESULTS AND DISCUSSION

Physical Carrying Capacity (PCC)

Physical Carrying Capacity in this study is the maximum number of tourists that can be accommodated in the area of Cidahu Nature Tourism Object. It takes into consideration the needs of tourists for an area to travel comfortably and the rotation factor.

To calculate the PCC, the data obtained are the area (24.33 ha), the opening hours (operational hours; 07:30-16:00, that is 8.5 hours per day), and the length of tourist visits to the Cidahu Nature Tourism Object. Based on the results of a questionnaire with 46 tourists visiting Cidahu's natural attractions, the average length of tourist visits is 3 hours. The rotation factor for the Cidahu Nature Tourism Object is 2.83, while the PCC value is 10,593. This means that the Cidahu Nature Tourism area can physically accommodate up to 10,593 tourists/day.

Real Carrying Capacity (RCC)

Real Carrying Capacity (RCC) is the number of tourist visits that can be accommodated by an area with consideration to the correction factor according to the characteristics of the area. Tree-level vegetation diversity is one of the correction factors. Based on the results of the tree-level vegetation inventory, 13 types of vegetation were obtained with a total of 188 individual trees. A table of values/indices for the diversity of flora of Cidahu Nature Tourism, according to the Simpson equation, is shown Table 1.

According to Table 1, the Simpson diversity index for tree-level vegetation (SDI) is 0.44. From the results of the Simpson's diversity index for tree-level vegetation of 0.44, then from this value approach the Simpson index ranges from 0 to 1, The closer the SDI value to 0, the greater the habitat diversity. As such, the flora diversity in Cidahu Nature Tourism Object is in the high category.

Another correction factor is the diversity of bird species. Based on the results of bird species inventory

Table 1. Results of tree-level vegetation inventory.

No	Tree Species	ni	ni (ni-1)
1	Damar (*Agathis dammara*)	140	19.460
2	Manii (*Maesopsis eminii*)	4	12
3	Puspa (*Schima walilcii*)	12	132
4	Mara (*Macaranga tanarius*)	6	30
5	Salam (*Eugenia poliantha*)	1	-
6	Saninten (*Castanopsis argentea*)	6	30
7	Rasamala (*Altingia excelsa*)	5	20
8	Pinus (*Pinus merkusii*)	2	2
9	Pasang (*Quercus* sp.)	5	20
10	Sempur (*Dillenia indica*)	2	2
11	Nangka (*Artocarpus heterophyllus*)	2	2
12	Lame (*Alstonia scholaris*)	2	2
13	Sungkai (*Peronema canescens*)	1	-
	Total	**188**	**19.712**

along the tourist area, we obtained 6 species of birds with a total of 15 individuals. The results of bird species inventory and the calculation of SDI value is shown in Table 2.

According to Table 2, the Simpson diversity index (SDI) for bird species is 0.684. Based, on the Simpson's index range, the closer the SDI value to 1, the lower the bird diversity. Thus, a SDI of 0.648 shows that the level of diversity of bird species in Cidahu Nature Tourism Object is within medium category.

Table 2. Results of bird species inventory.

No	Birds Species	ni	ni (ni-1)
1	Kutilang (*Pycnonotus aurigaster*)	9	72
2	Sri Gunting (*Dicrurus macrocercus*)	1	-
3	Elang Jawa (*Nisaetus bartelsi*)	2	2
4	Sepah Gunung (*Pericrocotus miniatus*)	1	0
5	Bubut Besar (*Centropus sinensis*)	1	-
6	Kedasi Hitam (Surniculus lugubris)	1	-
	Total	**15**	**74**

The tourist area of Cidahu Nature Tourism has landscape potentials that include canyon/steep slope at the waterfall. Landscape colors were also included to look into the differences in the green color of the vegetation, the brown and gray on the ground, and the white from the waterfall foam. No extreme colors, such as red or orange that may enrich the landscape, were found. A comprehensive assessment of the index of the landscape potential of tourism areas can be seen in Table 3.

Table 3. Assessment of the tourism area landscape potential index.

No	Criteria	Score	Value
1	Low and choppy hills; hills at the foot of the mountain or the bottom of the valley are not interesting landscaping features.	1	1
	Steep canyons/ slopes, volcanic cones or nteresting erosion patterns or variations in the size and shape of the land or the dominant detailed features.	3	
	High vertical relief aimed at the presence of striking peaks; peaks like towers; giant rock outcrops or amazing surface variations; easily eroded formations or very striking dominant features.	5	
2	Little or no difference in vegetation.	1	3
	Some types of vegetation but only 1-2 species are dominant.	3	
	A variation of vegetation type is indicated by interesting patterns, textures, and shapes.	5	
3	Subtle and contrasting color are generally dull.	1	3
	There are different types of colors, there is opposition from soil, rocks, and vegetation but not the dominant scenery.	3	
	A combination of colors of various types or beautiful opposition and colors of soil, rocks, aquatic vegetation and others.	5	
4	The nearby scenery has little or no effect on the quality of the scenery.	0	5
	The scenery nearby is quite influential on the quality of the scenery.	3	
	The scenery nearby greatly affects the quality of the scenery.	5	

5	It has an interesting background but is almost the same as the general situation in an area.	1	
	Typical though almost the same as a certain area.	3	3
	An area that is distinctive / different from other objects so as to make an impression.	5	
6	Modifications add variety but are very much at odds with nature and give rise to disharmony.	-4	
	Modifications add little or no diversity to the landscape.	0	0
	The construction of facilities such as installations / electricity, waterways, houses provide modifications that can add visual diversity; there is no modification.	2	
	Total	27	15
	Indeks Potensi Lansekap		**0.55**

Based on Table 3, the correction value of the landscape potential of Cidahu Nature Tourism Object is 0.55 or 55%.

According to field observations, the topography of tourist areas visited greatly by tourists can be grouped into seven trail segments. The seven segments are tourist trails and main tourist areas. The tourist trails from the Cidahu gate to the Check Dam campground and Curug 2 are relatively steep. As a result, on their way home, some tourists complained about the steepness of the climb. The opposite was experienced by tourists who entered from the steep trail of Cidahu gate to Pos Kancil as well as the path to Curug Sawer, as the trails allowed for 2-wheeled and 4-wheeled vehicles to pass, thus reducing the burden to tourists. The seven trail segments were thus assessed based on the general level of slope steepness. The assessment was carried out using a scoring system on the slope class criteria as shown in Table 4. The estimated slope index value was 0.46, or 46%.

With reference to the secondary data collated by Pirngadie (2012) the type of soil in the Cidahu Nature Tourism Object is andosol type. This soil type is highly sensitive to erosion, as it has a sensitivity index of 0.60, or 60%.

Based on data on rainfall and rainy days from 2016 - 2020, the number of dry months (months with rainfall <60 mm) is 12 and the number of wet months (months with rainfall >100 mm) is 44. The index value, Q, which compares of the number of dry months and wet months for the last five years, is 0.272.

By calculating the six correction factors, namely tree diversity (Cf1), bird species diversity (Cf2), landscape potential (Cf3), slope steepness (Cf4), soil erosion

Table 4. Slope index assessment of tourist areas.

No	Location	Estimation	Value	Notes
1	The trail from the gate to the camping ground block 1	A bit steep	60	Assessment criteria:
2	The trail from the *camping ground* blok 1 to *camping ground* blok 3	Ramps	40	Flat = 20 Ramps = 40
3	The trail from *camping ground* blok 3 to Pos Kancil	Flat	20	A bit steep = 60 Steep = 80
4	Trail from *wooden deck* to *camping ground* cek dam	Steep	80	Very steep = 100
5	Trail from *camping ground* cek dam to amber forest	A bit steep	60	
6	Trail from amber forest to Curug 2 Undak	Ramps	40	
7	Trail to Curug Sawer	Flat	20	
	Average	**46**		**(ramps and a bit steep)**
	Slope Value Index (x100%)	**0.46**		

sensitivity (Cf5), and rainfall (Cf6), the Real Carrying Capacity value (RCC) can be determined. Summary of data regarding the value of the correction factor can be seen in Table 5.

Based on Table 5, the value of the Real Carrying Capacity with the correction factors in Cidahu Nature Tourism Object is 148 tourists per day.

Table 5. Value of correcting factors in determining the value of carrying capacity of nature tourism.

Parameters	Index Value	Index Value (%)
Tree-level vegetation diversity (Simpson Diversity Index);	0.440	44
Bird diversity (bird density, Simpson Diversity Index);	0.648	64.8
Landscape potential index (Indeks *Bureau Of Land Management);*	0.55	55
Slope index;	0.46	46
Soil sensitivity index to erosion;	0.60	60
Precipitation index (Q value index [dry month/wet month])	0.272	27.2

Effective Carrying Capacity (ECC)

Effective Carrying Capacity (ECC) in Cidahu Nature Tourism is the maximum number of tourists that can be accommodated at the Cidahu natural attractions at a certain time by considering the correction factors and the Management Capacity (MC), such as the availability of employees.

Cidahu Nature Tourism has a total of 45 workers or officers consisting of BTNGHS, Wana Lestari Cooperative and BUMDES Bangkit Sejahtera. According to Anonymous in Sayan & Atik (2011), for an area to be managed properly, the area must have a minimum of 26 employees including managers, administration, security, drivers. As such, it appears that the quantitative needs for employees or management officers at Cidahu Nature Tourism Object have been met. However, due to the large area (24.33 Ha), the manager of the Cidahu Nature Tourism felt that he still needs an additional 5 people to 50 people, assuming that an area of 1 ha would be managed/supervised by 2 management officers. Based on this understanding, the value for Management Capacity (MC) would be 0.9259, and the Effective Carrying Capacity value in Cidahu Nature Tourism would be 133 people. Thus, the number of tourists who are expected to travel in Cidahu natural attractions without causing disturbance to the conservation area ecosystem would be a maximum of 133 people/day. The number of tourist visits to Cidahu's natural attractions in 2012-2020 was 273,577 tourists or an average of 84 tourists per day. From this figure, the area can still accommodate 49 more tourists a day.

Tourism Carrying Capacity

By calculating the Physical Carrying Capacity (PCC), Real Carrying Capacity (RCC) and Effective Carrying Capacity (ECC), we conclude that PCC > RCC > ECC (i.e., 10,593 > 148 > 133). Based on this result, the maximum number of tourists that can be accommodated physically or in the area in the Cidahu Nature Tourism Object is 10,593 tourists per day. With the correction factors that took into account the physical landscape and tourist activities, the maximum number of tourists that can be accommodated is 148 people per day. The maximum number of accommodated tourists with the correction factors and with consideration the Cidahu Nature Tourism's Management Capacity is 133 tourists per day. It can thus be concluded that the carrying capacity of tourism in Cidahu's natural attractions as of now can still accommodate tourists, with all tourism activities carried out properly and fully functioning.

The study carried out on the Cibodas Botanical Gardens by Sasmita (2014) also revealed that the maximum number of accommodated tourists is 593 people per day while the maximum number of accommodated tourists with consideration to the correction factors and Management Capacity is 549 tourists per day. Based on our research and the work done by Sasmita (2014), it can be concluded that the natural tourism objects have a greater carrying capacity for natural tourism if they are supported by biotic and abiotic factors in the area properly maintained and with adequate management.

CONCLUSION

Based on PCC value, the maximum number of visitors that can be carried within the total area of tourism area in Cidahu is 10,591 visitors per day. Based on the RCC value, taking into account the six correction factors used for this study, the maximum number of tourists who can be allowed to visit Cidahu Natural Tourism Object is 148 tourists per day. Under the ECC value, the maximum number of tourists visiting Cidahu's natural attractions, by considering the physical, ecological, and management aspects, is 133 tourists per day. The results of the calculation of the carrying capacity of Cidahu Nature Tourism Object show PCC > RCC > ECC. This means

that it can accommodate tourists with all their activities properly when the actual number of tourists does not exceed the maximum limit of the ECC value.

REFERENCES

Azwar, S. (2012). *Metode Penelitian*. Yogyakarta: Pustaka Pelajar.

Balai Taman Nasional Gunung Halimun Salak [TNGHS]. (2018). *Laporan Rencana Pengelolaan Jangka Panjang Taman Nasional Gunung Halimun Salak Periode 2018-2027*. Sukabumi: BTNGHS, Dirjen KSDAE Kementerian Lingkungan Hidup dan Kehutanan.

Cifuentes, M. (1992). Determinación de capacidad de carga turística enáreas protegidas (No. 194). Bib. Orton IICA/-CATIE.

Fandeli, C., & Nurdin, M. (2005). *Pengembangan Ekowisata Berbasis Konservasi di Taman Nasional*. Yogyakarta: Fakultas Kehutanan Universitas Gadjah Mada, Pusat Studi Pariwisata Universitas Gadjah Mada dan Kantor Kementerian Lingkungan Hidup.

Fandeli, C., & Nurdin, M. (2009). *Prinsip-prinsip Dasar Mengkonservasi Lansekap*. Yogyakarta: Gadjah Mada University Press.

Manning, RE (2001), Programs that work visitor experience and resource protection: A framework for managing carrying capacity of national parks. *Journal of Park and Recreation Administration*, 19(1), 93-108.

McCool, S., & Moisey, R.N. (2008). *Tourism, Recreation, and Sustainability: Linking Culture and the Environment*. 2nd edition. Oxfordshire, United Kingdom: CAB International.

Pickering, C.M., & Hill, W. (2007). Impacts of recreation and tourism on plant biodiversity and vegetation in protected areas in Australia. *Journal of Environmental Management*, 85, 791-800.

Pirngadie, B.H. (2012). Kajian Ketersediaan Air Minum dalam Mendukung Pengembangan Kegiatan di Kecamatan Cidahu Kabupaten Sukabumi [Doctoral dissertation]. Bandung, Fakultas Teknik Universitas Pasundan.

Sasmita, E. (2014). Analisis daya dukung wisata sebagai upaya mendukung fungsi konservasi dan wisata di Kebun Raya Cibodas Kabupaten Cianjur. *Jurnal Manajemen Resort dan Leisure*, 11(2), 71-84.

Sayan, M.S., & Atik, M. (2011). Recreation carrying capacity estimates for protected areas: A Study of Termessos National Park (Turkey). *Ekoloji*, 20(78), 66-74.

Sheppard, D. (2006). *The New Paradigm for Protected Areas: Implications for Managing Visitors in Protected Areas in Exploring the Nature of Management*. In Siegrist, D., Clivaz, C., Hunziker, M. & Iten, S. (Eds.) *Proceedings of the Third International Conference on Monitoring and Management of Visitor Flows in Recreational and Protected Areas*. Rapperswil, Switzerland: University of Applied Sciences Rapperswil.

Soemarwoto, O. (2004). *Ekologi, Lingkungan Hidup dan Pembangunan. Edisi ke-10*. Jakarta: Penerbit Djambatan.

Suwantoro, G. (2004). *Dasar-Dasar Pariwisata*. Yogyakarta: ANDI