

Site planning for Gudawang Karst Caves, Bogor, Indonesia

Journal of Tourism, Hospitality & Culinary Arts (JTHCA)
2017, Vol. 9 (2) pp 97-112
© The Author(s) 2017
Reprints and permission:
UiTM Press
Submit date: 25th June 2017
Accept date: 15th Aug 2017
Publish date: 30th Sept 2017

Andrianto Kusumoarto*

Rahmat Rejoni

Architecture Study Program, Indraprasta University, Indonesia
andri_anto72@yahoo.com

Joko Mijiarto

School of Postgraduate, Bogor Agricultural University, Indonesia

Proposed citation:

Kusumoarto, A., Rejoni, R. & Mijiarto, J. (2017). Site planning for The Gudawang Karst Caves, Bogor, Indonesia. *Journal of Tourism, Hospitality & Culinary Arts*, 9(2), 97-112.

Abstract

The Gudawang Karst Caves Area (GKCA) is a potential area to be developed as a special interest ecotourism destination area and caves conservation ecotourism area. GKCA located in *Cigudeg, Bogor* Regency. The purpose of this research is to make site plan on GKCA development for ecotourism destination. There are three caves of *Si Masigit Cave*, *Si Menteng Cave*, and *Si Pahang Cave*. Based on the analysis of carrying capacity, the maximum number of entourage entered the cave is less than ten people with a maximum time limit of 20-30 minutes. Based on the site analysis, the area can be developed are the area for special interest ecotourism activities (caves), buffer area activities, and cave conservation area activities.

Keywords:

Site planning, ecotourism, caves, conservation, Gudawang Karst Caves area

1 Introduction

Development of ecotourism activities in a cave landscape based on natural resources is expected not to damage the integrity of the ecosystem. The *Gudawang* Karst Caves Area (GKCA) is a karst caves area in Bogor. This Site as a place and as a habitat with a variety of beauty and uniqueness of habitat in a spatial geography is a

location that has a unique character. On the other hand, there will be dangerous damage if no safeguards and conservation efforts are taken. In order to maintain the value of sustainability and ecotourism development of special interest and ecotourism conservation, it is necessary to make a plan of GKCA development site. Karst area is an ecosystem that can provide benefits and push the social value of society as part of cultural heritage, and also provide the economic benefits, too. This can improve the quality of life for tourist, local communities and customs around the area. This study aims to create a site plan for the GKCA.

2 Literature Review

2.1 Karst caves area

Caves are underground tunnels formed from cracks as a result of limestone dissolution. Caves have benefits for human living, both can be felt directly or indirectly (Samodra, 2001). One of the benefits of the cave is as an ecotourism attraction (Purnomo, 2009). Karst area is an ecosystem that is vulnerable to damage and if it has been damaged difficult to repair (Mijiarto, 2015). Karst area is also an important asset as a source of water, rare biota, history artifacts of human living (Kovarik & Beynen, 2015). The karst caves area not only provides benefits to the protection and conservation of nature, but also benefits the economic value and social value (Mijiarto, 2015).

2.2 Site planning

Site planning for the karst cave ecotourism destination is an activity to planning and maintains the uniqueness of the habitat and beauty of the caves and connects the two as a whole in the ecotourism system. The new paradigm in landscape planning and design that the site can't be separated by the surrounding landscape as a whole (Motloch, 2001). Based on survey results, there are three caves within the GKCA area which is the boundary in the planning, namely Sipahang Cave, Simenteng Cave, and Simasigit Cave.

2.3 Site planning activities

The scale of planning is a site planning scale that accommodates tourists desires and tourism product development (Gunn, 1994). The site planning for expected ecotourism is the planning of the site for ecotourism destination (special interest and conservation tourism) so as to enhance the value of conservation, ecological health, and tourism activity itself (Drumm & Moore, 2002). Based on survey results, the main access to the entrance is still not well conditioned, making it difficult for wheeled vehicles. The entrance is the main access (main gate) to get into GKCA. Utilities and services in GKCA are still lacking, evident from the lack of toilet and wastewater treatment systems. There are not several service units such as, information center,

limited parking area, children play area, and so forth. Planning needs to be done to provide good service to visitors who come to GKCA.

3 Methodology

3.1 Research location and time

The research location is located in GKCA, Cigudeg, Bogor, Indonesia. This research was conducted from September 2015 until December 2015. There are three caves, namely *Si Pahang Cave*, *Si Menteng Cave*, and *Si Masigit Cave*.

3.2 Method

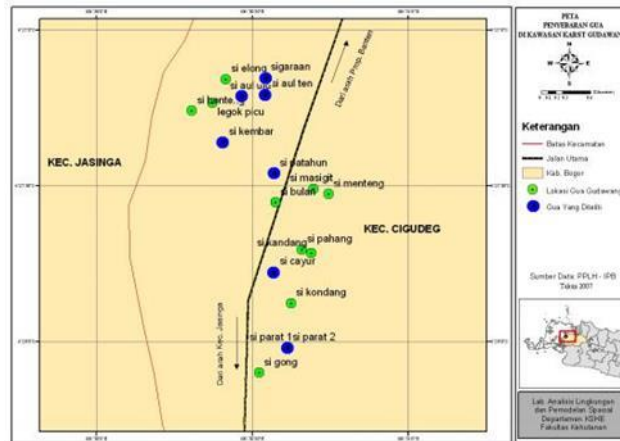
The method used in this research is descriptive method through field survey and interview. The scale of planning is a site planning scale that accommodates tourist's desire and ecotourism product development (Gunn, 1994). The Steps of research conducted are 1) inventory of local government policy of Bogor Regency; 2) literature study; 3) inventory of biophysical, socio-cultural conditions of surrounding communities; 4) site analysis; and 5) site planning. Site planning conducted at GKCA aims to accommodate the visitor's desire to conduct tourism activities within a unique and distinctive geographical space that must be protected and preserved within a single regional ecosystem. In the development planning of ecotourism activities within the preservation area, several things that must be considered include the existence of biodiversity that has mutual dependence on each other and the threat that is very critical both from within and from outside.

4 Findings

4.1 General condition

Based on the survey results, some problematic constraints have been found to be: access, zones, landscape, service area, utilities and services. Planning focus on 3 caves, namely Sipahang Cave, Simenteng Cave, and Simasigit Cave. GKCA is located in Kampung Cipinang, Argapura Village, Cigudeg District, Bogor Regency. Geographically located between 06°27'08.9" - 06°27'58.0" SL and 106°30' 18.4 "-106°30'44.7" EL. This GKCA has an area of approximately 300 Ha (Figure 1). Boundaries are as follows:

North	: <i>Cibangur</i> Village
South	: <i>Rengganis</i> Mountain
West	: <i>Tipar</i> Village
East	: <i>Binangkit</i> Mountain and <i>Cimapang</i> Village



Source: Mulyati (2007)

Figure 1: Gudawang Karst Caves Area

GKCA is an A temperate zone with an average rainfall of 2,500-5,000 mm year. The average temperature of this area is 28-29°C with a minimum temperature of 23°C and the maximum temperature is 33°C. The altitude in this area varies between 115-142 m asl. The number of heads of households in *Cipining* ± 2000 KK, with the majority of the population is Muslim. The livelihoods of most of the population are farming, factory workers, garden workers and trading as well as miners of limestone. The majority of society's last education is elementary school graduates.

GKCA which has been developed into an ecotourism destination area has an area of 2.7 ha. This area is a cultural heritage and science area based on West Java Provincial Regulation No.20 of 2003 on Spatial Planning of West Java Region and based on Local Regulation of West Java Province No.2 of 2006 About Tourism Area. The GKCA has 24 caves consisting of dry caves and watery caves. The dry caves are 9 caves: *Si Bulan 1*, *Si Bulan 2*, *Si Gong*, *Gopala*, *Si Masigit*, *Si Nampol*, *Si Kandang*, *Si Kondang* and *Si Tembok*. While the number of caves aqueous as many as 15 caves of *Si Kembar*, *Si Parat 1*, *Si Parat 2*, *Si Aul Tengah*, *Si Aul Ujung*, *Si Garaan*, *Si Cayur*, *Si Patahan*, *Si Pahang*, *Si Menteng*, *Si Elong*, *Si Delan*, *Si Langir*, *Si Leseh* and *Legok Picung* (see Figure2). The caves that have been developed as an ecotourism destination are *Si Menteng*, *Si Masigit* and *Si Pahang*. The three caves are located in the area of land of the Regional Government of Bogor Regency (Mulyati, 2007).

4.1.1 *Si Menteng Cave*

Si Menteng Cave is one of three caves that have been developed as an ecotourism object. This cave is an active horizontal cave. *Si Menteng Cave Mouth* has been modified to resemble the tiger's mouth shape in 1999. In this cave has been built 15 steps and has been given lighting to facilitate visitors into the cave. This cave was also used as a source of water for the community. The map above the cave can be seen in Figure 2.



Source: Mijiarto (2013)

Figure 2: The mouth of the cave and the map looks over *Si Menteng Cave*

4.1.2 *Si Masigit Cave*

Si Masigit Cave is not far from *Si Menteng Cave*. The mouth of this cave has also been modified in the form of a tiger mouth and made the stairs. This cave is a horizontal cave. The top view map of *Si Masigit Cave* can be seen in Figure 3.

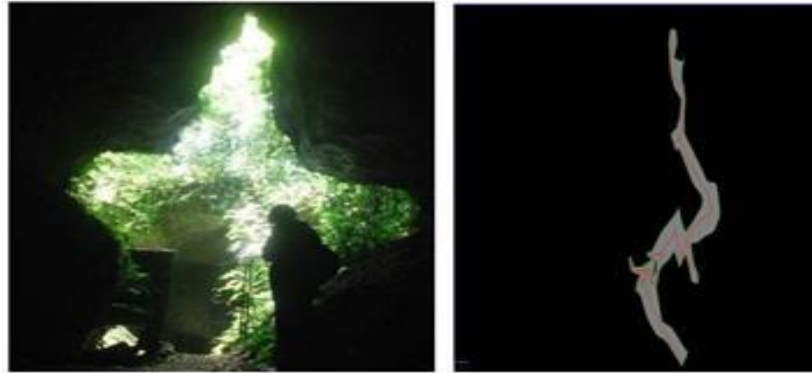


Source: Mijiarto (2013)

Figure 3: The mouth of the cave and the map looks over *Si Masigit Cave*

4.1.3 Si Pahang Cave

Si Pahang Cave is a cave that has been developed into an ecotourism object. This cave is outside of the Government land authority, where the Government of Bogor Regency just bought a path to get to the cave. This cave is an active horizontal cave and the existence of underground river flow. The map above the cave can be seen in Figure 4.



Source: Mijiarto (2013)

Figure 4: The mouth of the cave and the map looks over Si Pahang Cave

The physical carrying capacity of the *Gudawang* Cave area is determined by the maximum number of visitors allowed in one rotation of the cave entrance. The maximum number of single entourage entered the cave is as many as 7-8 people with a maximum time limit of between 20-30 minutes once entered. In one rotation in the three caves (1 cave mouth of the *Si Menteng* Cave, 1 cave mouth of the *Si Masigit* Cave, and 2 Cave Mouth of the *Si Pahang* Cave), maximum allowable is 28-32 people. In a day potentially as much as 12-18 rotations, if in a day *Gudawang* Cave tourism area was opened for six hours (at 10:00 to 16:00 am). Total visitors allowed to entry the cave in a day as many as 336-576 people.

The main access road to the entrance is still not well conditioned, making it difficult for wheeled vehicles (see Figure 5). Topographic conditions in the site vary, from flat, ramps to steep (see Figure 5). In the GKCA protected zone, contour variations are highly visible, especially for access to the cave mouth. For topography in the cave, the condition of the three caves has differences, with characteristic topographical variations quite lopsided. For example, in *Si Menteng* Cave, starting from the cave mouth up to the next three meters, the circulation path is very steep (> 300), but the next cave path becomes flat. *Si Masigit* Cave has steep ramp characteristics, while the watery *Si Pahang* Cave has a flat - sloping characteristic. However, among the three caves, *Si Pahang* Cave is the riskiest because the only watering caves that will flood in case of rain.

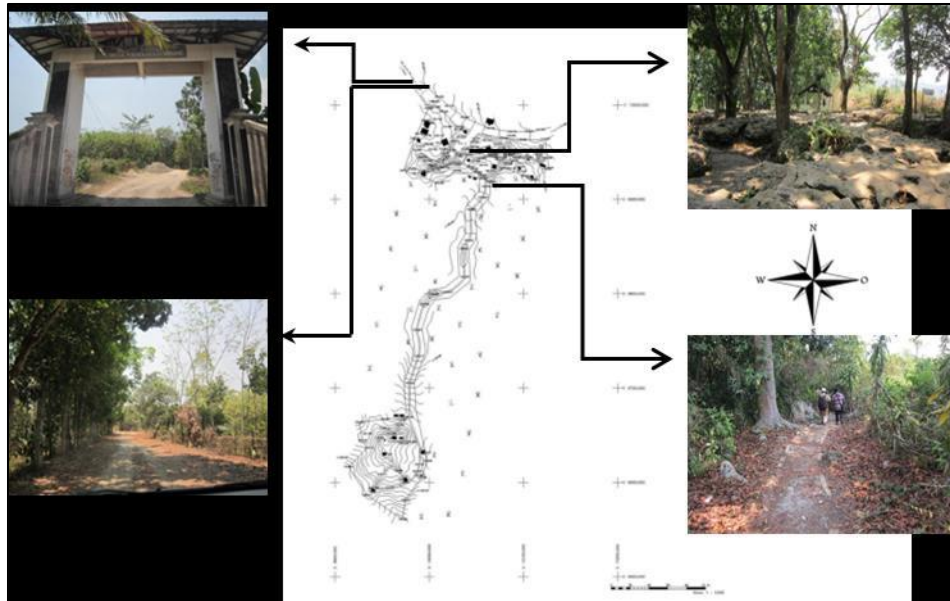


Figure 5: Accessibility and topographic conditions in the GKCA

This area has unique rock and geological characteristics, because there are many rocks although the location is quite far from the sea/beach. This rock is a natural rock (karst) formed by natural processes (see Figure 6). The existence of these rocks can be a special attraction for tourists. Natural resources in GKCA are potential that can be optimized as environmental services (Mijiarto, 2015). One of the optimization program related to the development of tourism is the improvement of facilities and infrastructure. This program can be done by making ecotourism planning and design of GKCA. Site planning and design is a process and means of solving the natural environment and human needs and minimizing the impact that will occur (Filor, 1994).



Figure 6: Karst in GKCA

The ecotourism object of *Gudawang* Cave is an ecotourism object that has some resources of karst area that has the potential to be developed as a special interest ecotourism destination and cave conservation tour, so that the concept can be encouraged in increasing the conservation of karst area and the income of the surrounding community and local government. The authenticity of an object is a major target in a special interest tour. This is done to minimize the damage caused by ecotourism activities.

The activities that can be developed as a main activity ecotourism special interest one of which can be cave searching (adventure tourism) and observation of cave biota (educational tourism). Ecotourism activities are expected to provide understanding for visitors and the community in terms of preservation of existing natural resources (karst area). Each cave has its own charms like the *Si Menteng* Cave with its long trails, the watery and adrenaline *Si Pahang* Cave, or the short *Si Masigit* Cave, but quite curious and mysterious.

4.2 Site Analysis

Gudawang Cave area is a cave conservation area. Protection of the cave preservation is the main principle. Based on the observation, three caves namely *Si Menteng* Cave, *Si Masigit* and *Si Pahang* in the area are still in good condition. On the other hand, in some protected locations there is a lack of good cave track. In this case it is necessary to add the area of the area designated as protected zone, preservation zone and buffer zone. One of the location is still a constraint is the welcome area (Figure 7). The problem seen is the absence of an orientation marker to enter the area. In addition, road conditions and road width are not good for motor vehicles to pass. The condition of the gate is currently not good and must be repaired and also surrounding building.

Gudawang Cave area has potential land as parking area and management office on the east and camping ground area to the north of *Si Menteng* Cave (see Figure 7). These areas can be utilized by visitors in large number. But considering that this area is a conservation area then the number of visitors should be limited especially visitors who enter into the cave. There is currently no management office to undertake management and administrative activities of the area. In this case, the management office and guard house are required to make the area more manageable. Some facilities are needed in the service area such as guardhouse, gazebo, shelter, mosque, garbage can, lighting for the area and for inside cave, seating, safety fence. Some of the facilities that need to be repaired are pavement, steps and ramps, and retaining walls at the entrance of the cave mouth.

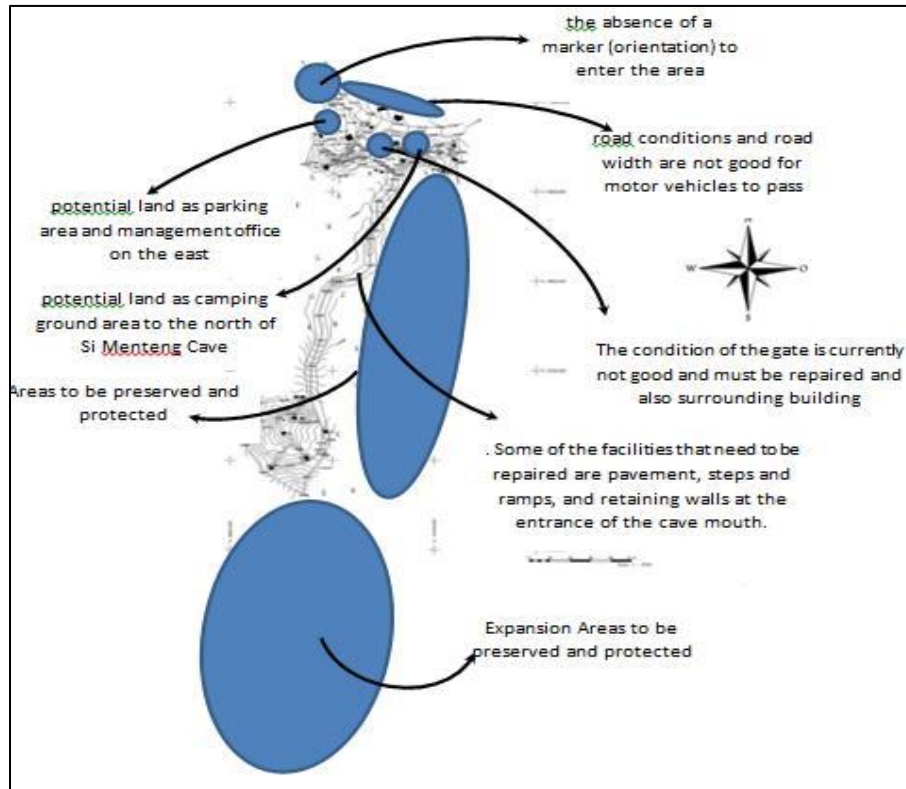


Figure 7: Site analysis

4.3 Zoning Planning

Zone planning for GKCA is divided into three zones, namely the protected zone (welcome area, service area, and cave area), buffer zone, and as well as zone of preservation (see Figure 8). The protected zone is planned for an area of 1.6 ha, a planned buffer zone of 4 ha, and a planned preservation zone of 15.32 ha. A protected zone is a zone where the protection of topography and other physical conditions and karst cave authenticity conditions. Welcome area includes the main access facility, parking area, gate, and meeting point. Service area includes canteen area and souvenir shop, mosque and toilet. Three caves area which is the main part of the protected zone. A buffer zone serves to protect the existence of the core zone. A buffer zone has facilities such as spots to rest at once can be used as an area of observation to the mountain and community land which is a good view on the west side of the area. A preservation zone is a zone used to protect the existence of the three caves and the existence of other areas so as to avoid the degradation and damage and sustainability of the cave and its surroundings. The preservation zone is planned to protect the existence of the three caves, especially the existence of caves as a source of water and wildlife life. The preservation zone is planned to be larger than the area of existence of the three caves and its buffer zone (see Figure 9). Circulation in the ecotourism

destination area is planned with a loop model. There is only one main door as access to and exit area (see Figure 10).

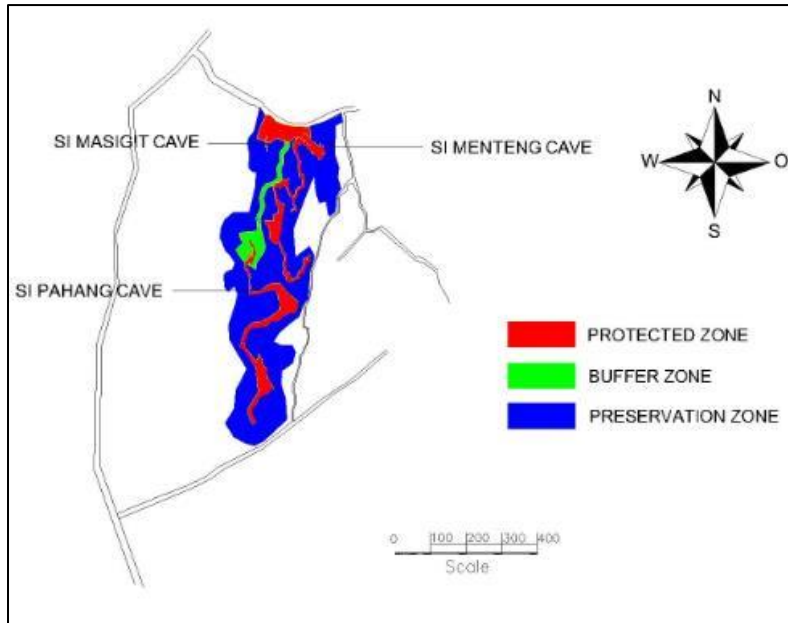


Figure 8: Zone planning

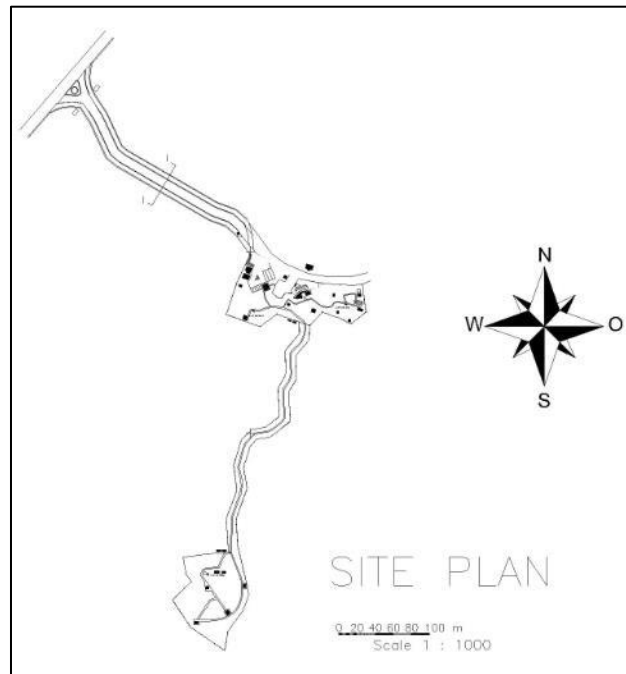


Figure 9: Preservation zone planning

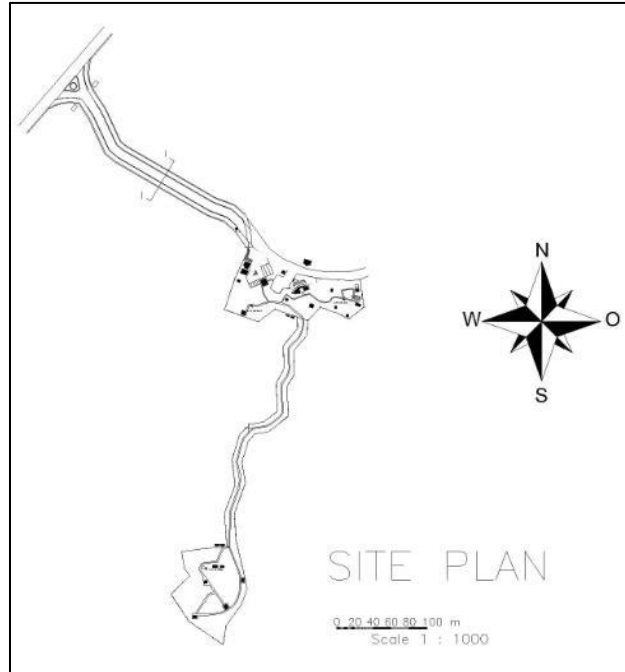


Figure 10: Circulation planning

4.4 Site Planning

The site planning is a total planning of the entire development zone along with its preservation zone. Figure 11 shows the zone development site plan. The dimensions of each cave that can be used for tourist spaces of special interest can be estimated as shown in Figures 12, 13, and 14. The main gate is the main access to get into GKCA. Main gate planning needs to be done to provide good service to visitors who come to GKCA. Figures 15 and 16 show site planning at the main gate of GKCA.

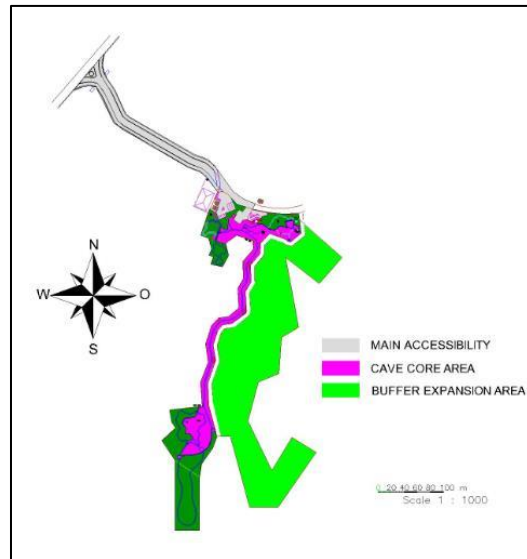


Figure 11: Site planning

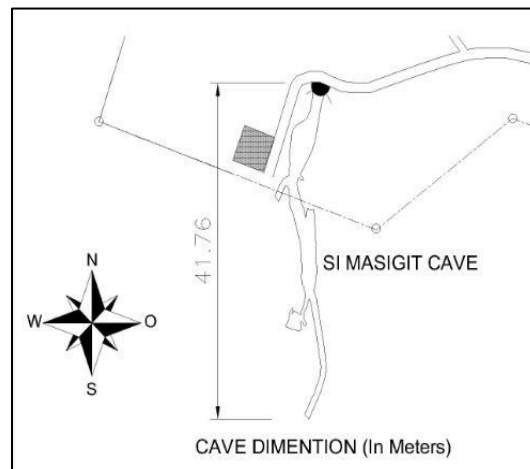


Figure 12: Dimension of *Si Masigit* cave

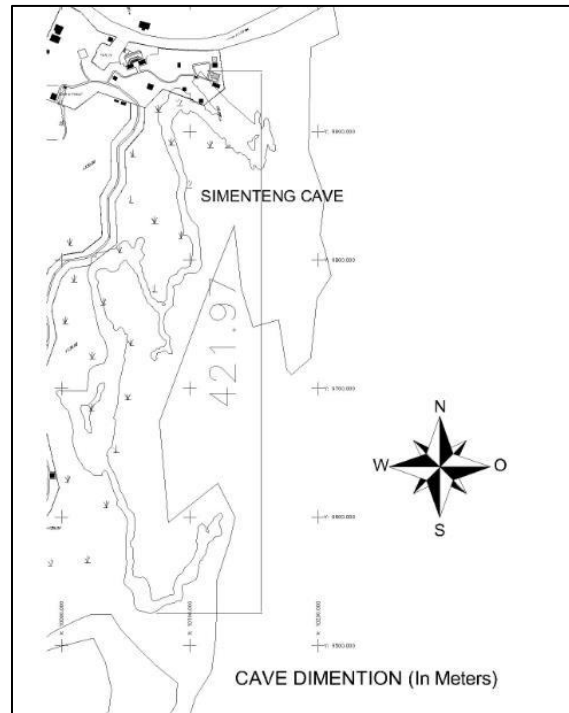


Figure 13: Dimension of *Si Menteng* cave

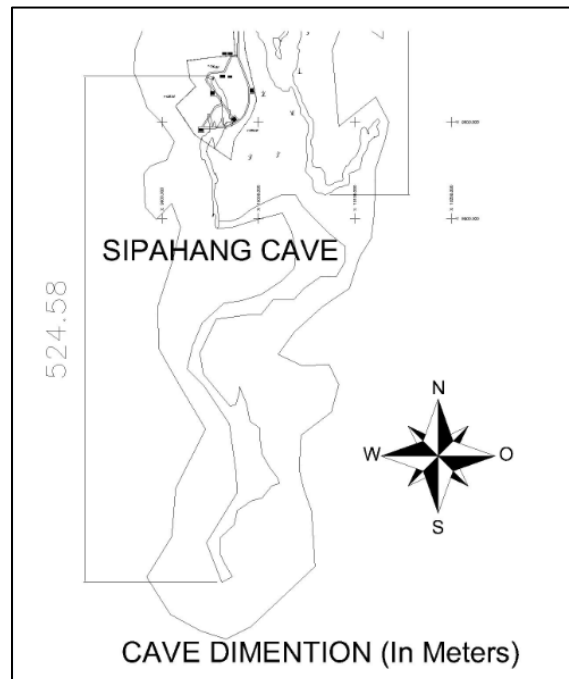


Figure 14: Dimension of *Si Pahang* cave

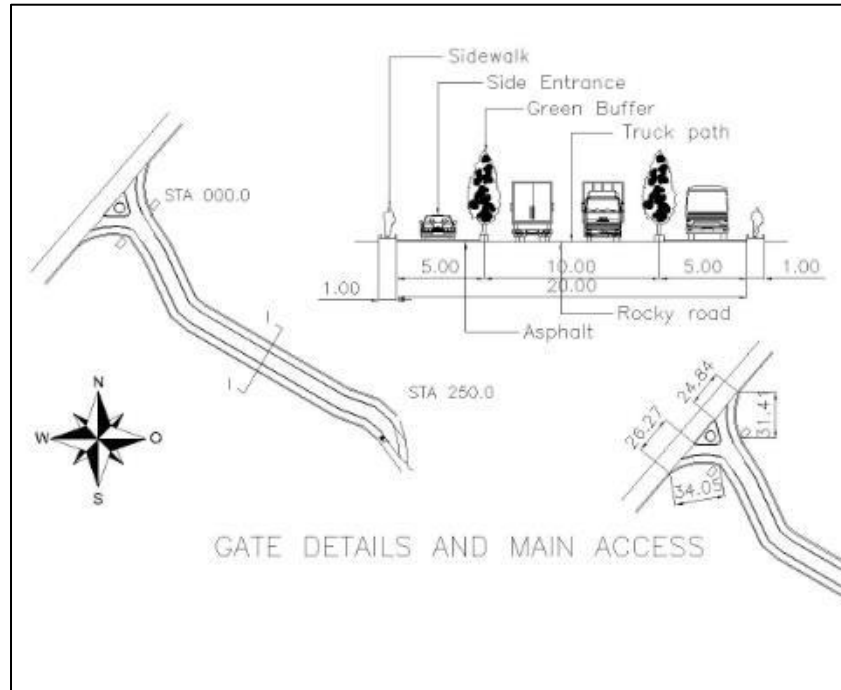


Figure 14: Site planning of main gate GKCA

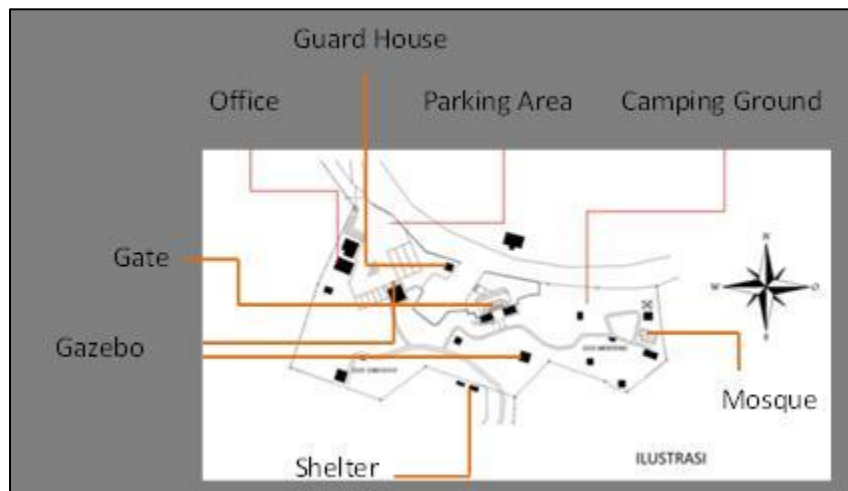


Figure 15: Site planning of the main access into *Si Masigit Cave*, *Si Menteng Cave* and *Si Pahang Cave*

5 Conclusion

The GKCA is a potential area to be developed as an ecotourism destination area of special interest and cave conservation tours. Three caves that are in GKCA are very potential to be developed as a special interest tourism area that is *Si Masigit Cave*, *Si Menteng Cave* and *Si Pahang Cave*. The zones planning developed based on site planning are protected zone, buffer zone and preservation zone. The total area of 16.97 Ha consists of a protected zone of 1.6 Ha, a buffer zone of 4 ha, and a preservation zone of 15.32 Ha. The maximum number of single entourage entered the cave is as many as 7-8 people with a maximum time limit of between 20-30 minutes. The special interest ecotourism destination area located in the core zone is three of these. Inside the protected zone there are welcome area and service area to serve the needs of visitors. A protected zone is a zone where the protection of topography and other physical conditions and karst cave authenticity conditions. A buffer zone is a protective zone for the cave that is in the vicinity such as buffers on the connecting lane between the caves above the soil surface and buffers around the cave. A preservation zone is a zone that protects the sustainability of the three caves to avoid environmental degradation and damage.

6 About the author

Andrianto Kusumoarto is Doctoral Candidate, Study Program of Natural Resource Management and Environment, Postgraduate Program, Bogor Agriculture University. Currently the author is a lecturer in Indraprasta PGRI University majoring in Architecture Study Program, Jakarta. The author earned a Master's Degree in Landscape Architecture from the Bogor Agriculture University in 1996. The author has been involved in numerous related studies in the field of Landscape Architecture and Natural Resources and Environmental Management as well as Ecotourism Planning and Design. In the 2013-2016 stewardship, the author holds the position of Vice Chairman of the Domestic Affairs. The author has also been trusted by LPJKN to become one of the ASEAN CCS (Coordinating Committee on Services) Landscape Architecture members. In the field of construction services, the author has been active in the organization GAPENSI (Association of Indonesian Construction Executors) Bogor City, Chamber of Commerce and Industry (KADIN) Bogor City, and AKLANI (Association of Landscape Contractors Indonesia) West Java.

Rahmat Rejoni earned his Bachelor's degree from Department of Civil and Planning, Medan Institute of Technology in 2004. After his graduation until 2013 he was involved on a planning, supervision, and construction project in some consultants. After presenting his thesis about Application System Assessment Tool for Residential Area, he earned his Master's Degree in Landscape Architecture from Faculty of Agriculture, Bogor Agricultural University. Rahmat Rejoni now is a lecturer at Indraprasta University PGRI Jakarta, majoring in architecture study program and he

can be reached through rahmat.rejoni@gmail.com. His research interests are including but not limited to Architecture Sustainable, green architecture, and historic area.

Joko Mijiarto is a Master's Degree in Ecotourism and Environmental Services Management Study Program, Bogor Agriculture University. The author has attended International Workshop and Training on Building Collaboration in Biodiversity Informatics in 2015, Tourism Auditor Training by the Ministry of Tourism of the Republic of Indonesia in 2015, International Journal Writing Training in 2015, Basic Education and Training on Karst and Cave in 2010, and Education and Basic Training on *Herpetofauna* in 2010.

7 References

- Drumm, A. & Moore, A. (2002). *An Introduction to Ecotourism Planning*. Volume 1. Virginia: The Nature Conservation.
- Filor, S. W. (1994). The nature of landscape design and design process. *Landscape and Urban Planning*, 30(2), 121-129.
- Gunn, C. A. (1994). *Tourism Planning Basics, Concepts, Cases*. Third Edition. London: Taylor & Francis Ltd
- Kovarik, J. L. & van Beynen, P. E. (2015). Application of the Karst Disturbance Index as a raster-based model in a developing country. *Applied Geography* 63(3), 396-407.
- Mijiarto, J. (2013). *Potensi dan Pemanfaatan Jasa Lingkungan Kawasan Karst Gua Gudawang*. [Skripsi] Bogor (ID): Institut Pertanian Bogor.
- Mijiarto, J. (2015). *Strategi Pemanfaatan Jasa Lingkungan Kawasan Karst Gua Gudawang, Kabupaten Bogor*. [Tesis] Bogor (ID): Institut Pertanian Bogor.
- Motloch, J.L. (2001). *Introduction to Landscape Design*. Canada: John Wiley & Sons Inc
- Mulyati, T. (2007). *Kajian Kondisi Gua Untuk Pengembangan Wisata Minat Khusus di Kawasan Karst Gua Gudawang, Kabupaten Bogor*. [Skripsi] Bogor (ID): Institut Pertanian Bogor.
- Purnomo, C. (2009). Strategi pemasaran produk wisata minat khusus Goa Cerme, Imogiri, Bantul. *Karisma* 3(2): 99-112.
- Samodra, H. (2001). *Nilai Strategis Kawasan Karst di Indonesia*. Bandung: Pusat Penelitian dan Pengembangan Geologi.