

ZONING EVALUATION IN THE KARST CAMPURDARAT OF TULUNGAGUNG DISTRICT

Ratri Juang Megarismi¹

¹Departement of Archaeology, Faculty of Cultural Sciences, Universitas Gadjah Mada
Email: ratrijuangmegarismi@mail.ugm.ac.id¹

Received September 14, 2025; Revised September 23, 2025; Accepted September 24, 2025

Abstract

Zoning is an important part of preservation, but sometimes the process is not in accordance with Undang-undang No. 11 Tahun 2010 on Culture Heritage. In Wajak Cave and Song Gentong Cave, zoning studies still need to be evaluated, especially at this time there are several problems that occur in the two caves. So the analysis used is zoning analysis, policy analysis, and SWOT analysis of zoning aspects. So that the recommendations that can be given after the analysis are the establishment of the Wajak Cave and Song Gentong Cave Cultural Heritage along with the zoning determination, the intervention of related policy makers, increasing public awareness of the caves, and overcoming marble mining in the area.

Keywords: Zoning, Wajak cave, Song Gentong Cave, Tulungagung.

How to Cite: Megarismi, R.J. (2025). Zoning Evaluation in The Karst Campurdarat of Tulungagung District. *Kalyanamitra: Journal of Archaeological Resource Management*, 1(2), 103-114.

Copyright 2025 © The Author(s)

The work is licensed under a [Creative Commons Attribution-NonCommercial 4.0 International \(CC BY-NC 4.0\)](https://creativecommons.org/licenses/by-nc/4.0/)



1. Introduction

In accordance with Undang-undang No. 11 Tahun 2010 concerning Cultural Heritage explains that Cultural Heritage is an immaterial cultural heritage in the form of Cultural Heritage Objects, Cultural Heritage Buildings, Cultural Heritage Structures, Cultural Heritage Sites, and Cultural Heritage Areas on land / or in water that need to be preserved because they have important values for history, science, education, religion, and / or culture through the determination process. Therefore, all cultural heritage has the right to be preserved and protected. In line with this, Undang-undang No. 11 Tahun 2010 concerning Cultural Heritage Article 1 explains that protection is an effort to prevent and overcome damage, destruction, or destruction by means of Rescue, Preservation, Zoning, Maintenance, and Restoration of Cultural Heritage.

According to the Web of the West Sumatra Provincial Cultural Heritage Preservation Center explains that one way to protect Cultural Heritage is to do zoning,

because human cultural heritage that cannot be renewed will become increasingly vulnerable, so that it is quickly damaged. In addition, the site also occupies a certain space in an area with a certain shape and landscape. These conditions can pose a serious threat to protection, preservation and utilization. Preservation is also not only oriented to the past, but also to the future, one of which is the utilization of the existence of the site.

In the Web of the Balai Pelestarian Cagar Budaya Provinsi Sumatera Barat, the zoning process is important because it is related to efforts to utilize space and control the future use of Cultural Heritage. Zoning studies can be one of the instruments in controlling the use of space in the Cultural Heritage area. So that the problem of development process deviations from inappropriate spatial plans can be prevented and avoided.

Although the process is not in accordance with the reality in the field. Given the many actors that must be involved in the zoning process. However, in practice the zoning process often does not match the reality in the field. Zoning involves many stakeholders, and without effective coordination, the process becomes weak and inconsistent. This is particularly critical for caves, which are fragile environments with unique ecosystems. Caves are highly sensitive to disturbances and require special protection, yet they are often overlooked in cultural heritage management. Zoning is a very important process in preservation. This applies to all cultural heritage, including caves. A cave is a naturally formed passage in the rock that acts as a water channel by connecting the entry point of water and the exit point of water. Caves themselves have a unique environment and are vulnerable to existing changes, including having special conditions that must be distinguished from other environments. One of the characteristics of a typical cave is the diversity of habitats that exist in the cave (Susanto, 2011).

In the Tulungagung Regency area, there are several caves that have been zoned. Some of these caves are caves in the Campurdarat Karst area in Tulungagung Regency, including Wajak Cave, Song Gentong Cave, and Tenggar Cave. But only two caves have undergone a zoning study process, namely Wajak Cave and Song Gentong Cave. Although it already has a zoning study, there are still some imbalances. From the various problems that exist, there should be an evaluation of the zoning study that has been carried out.

The problem are not limited to weak zoning documents but also seious threats on the ground. The current condition of Wajak Cave is very concerning, seeing the use of the Wajak Cave location as one of the flag-raising venues on August 17 with participants located at the Wajak Cave location. The process of widening the dirt road to the top as an easy access for participants to go up, thus ignoring the existence of Wajak Cave. In addition, not all people know the place where Wajak Cave exists. If you look at the position of Song Gentong Cave in Campurdarat Karst, it is right behind the location of the marble mining factory, PT Marmer Indonesia, which is right in the concession area. The two different problems in the two places cannot be underestimated considering the condition of the Campurdarat Karst area which does

have high economic value for the surrounding community. The economic interest of marble mining clash directly with cultural heritage preservation, creating a difficult problem. Marble mining itself is one of the main livelihoods of some people in the area, but it endangers Wajak Cave and Song Gentong Cave as one of the geological caves with material cultural heritage.

In addition, the zoning study that has been conducted does not provide clear boundaries of the two caves. If you look again at the existing zoning study, there are several things that are less understandable. In the variable section that has been given in the zoning study, it is less able to explain which boundaries are the boundaries. The reference that is only explained in the main part without being explained, along with the core zone that is only explained based on the size of the area is also less understandable.

2. Method

Evaluation is a process that seeks to obtain and provide useful information to assess and provide alternative decisions. The results of the existing assessment will then be used as a reference in the evaluation process in determining the level of success (Ismanto, 2014). Evaluation is also a systematic process to determine, make decisions to what extent the objectives set are well achieved (Djaali & Muljono, 2008).

So the method used is a qualitative method with descriptive analytics that leads to an evaluation of the existing Wajak Cave and Song Gentong Cave zoning studies then with the final result of recommendations. The analysis technique that will be used using analytical descriptive techniques is to describe the reality in the field with the form of primary data, and analysis is carried out so that it can answer the problem formulation. The analysis that will be used in this research is zoning analysis, policy analysis, SWOT analysis of zoning aspects.

The primary data were obtained through field observations and in-depth interviews with local stakeholders, including government officials, cultural heritage preservation staff, and community representative. Secondary data were collected from zoning documents, legal regulations, and related archival materials. The evaluation was conducted using several criteria: the clarity of zoning boundaries, the protection regulations, the effectiveness of policy implementation, and the balance between preservation and economic interest. Through these steps, the analysis aims to provide a comprehensive evaluation of the zoning studies of Wajak and Song Gentong Caves and formulated recommendations for their improvement.

3. Results and Discussion

The explanation of zoning is contained in Undang-undang No. 11 Tahun 2010 on Cultural Heritage, as a whole there are several articles discussing zoning. Article 1 explains the definition of zoning as determining the spatial boundaries of Cultural Heritage sites and Cultural Heritage Areas by necessity. So it can be understood that the relation of zoning is with the spatial and area which is close to the spatial planning of a region.

Another explanation is in Article 72 (1) which explains that zoning is a form of protection of Cultural Heritage that is carried out by setting limits on the extent and

utilization of space and must be based on studies. (2) The zoning system is determined by the minister if it is a national Cultural Heritage, governor if it is a provincial Cultural Heritage, regent/mayor according to the extent of the Cultural Heritage Site or Cultural Heritage Area in the regency/city. (3) The utilization of zones in Cultural Heritage can be done for recreational, educational, appreciative, and/or religious purposes.

In the next article, Article 73 (1) explains that the zoning system is to regulate the function of space in Cultural Heritage, both vertically and horizontally. (2) Vertical zoning arrangements can be made to the natural environment above the Cultural Heritage, on land and/or in water. (3) The zoning system as referred to above may consist of core zones, buffer zones, development zones, and/or supporting zones. (4) Determination of the area, layout, and function of the zone is determined based on the results of a study by prioritizing opportunities to improve people's welfare. In addition, Article 74 explains that further provisions regarding the procedures for determining the zoning system are regulated in a Government Regulation.

3.1. Findings in cave

3.1.1 Wajak Cave

Wajak Cave is the discovery site of the oldest Homo Sapiens fossil in Indonesia known as Homo Wajakensis. The initial discovery of Homo Wajakensis was made by a Dutch geologist, B.D. van Rietschoten on October 24, 1888 (Theunissenm, 1989 in Setiyabudi et al., 2019). Although the dating of Wajak Man has not been found, with the statement of Teuku Jacob (1977) in Kasnowihardjo (2010) which states that Wajak man is classified as proto-Australoid, the possibility of the arrival of the Mongoloid race in Java approximately took place 10,000 years ago, this is in accordance with the results of the C-14 dating analysis of Wajak fauna fossils (Kasnowihardjo, 2010). Fauna found in Wajak Cave include: Panther Trigis, Rhinoceros Sondaicus, Tapirus Indicus, Muntiacus Muntjak, Rusa Timorensis, Sus Vittatus, Acanthion Brachyurus, Manis Javanica, Rattus Tiomanicus, and Sciurus Nonatus (Long et al, 1996 in Prasetyo, 2015).

1.1.2 Song Gentong Cave

The first research conducted in Song Gentong Cave by Marliac & Simanjuntak in 1996 and mentioned that Song Gentong Cave was a preneolithic to neolithic dwelling place in accordance with the results of charcoal dating of combustion residues with an age of 7,000-5,000 years ago, which still needs to be continued considering that the research has not been fully resolved. Findings at the excavation only ranged from vertebrate fauna, molluscs, artifacts, and human bone fragments (Setiyabudi et al., 2019). The findings in the area are similar to some of the findings in Wajak, Hoegrot, and Kecil Caves which are included in the Pleistocene-Holocene faunal remains (Jacob, 1967 & Storm, 1995 in Prasetyo, 2015). Research and other sources regarding the Campurdarat Karst Cave are listed in Strom 1955, which does not mention the oldest

date but explains that there are important archaeological remains in the form of human remains and lithic artifacts (Simanjutak, 2011).

3.2. Current State of the Cave

3.2.1 Wajak Cave

The niche hardly looks like a cave. In Wajak Cave, only the upper part of the cave is visible, which looks like cliff rocks in the mountains. The surrounding environment in Wajak Cave has been widened using heavy equipment (bego), so that the road to the cave is wider and flatter. In addition, according to local residents, the Wajak Cave area is used as a place for ceremonies on August 17. Before the road was widened, the place where the Homo Wajakensis fossils were found, which was only covered by plastic, was no longer covered by plastic. The cover given as a marker is no longer there. In addition, there was soil from the road widening that jutted into the Homo Wajakensis discovery site.



Figure 1. Wajak Cave.

Source: Ratri, 2024

3.2.2 Song Gentong Cave

Song Gentong Cave originally had two alcoves with the names Song Gentong I Cave and Song Gentong II Cave. A concerning thing happened to the part of Song Gentong II Cave that experienced a change in the shape of the face of the cave. The part of the niche that protects the inside of the cave is missing due to illegal cutting. This is considering that part of the cave is made from marble which has high economic value for local residents. So that the condition of Song Gentong Cave at this time, one of which does not have an alcove and only leaves the white inside of the alcove.

3.3. Conservation history

Conservation that has been carried out is a zoning process, the other thing is research conducted by the campus in collaboration with related agencies. The zoning study was conducted on October 18-22, 2022. The result of the overall discussion in the zoning study is to provide an explanation of the important value of Wajak Cave and Song Gentong Cave in Campurdarat District. The important values of Wajak Cave and Song Gentong Cave are not only important in the field of archaeology but also include important values in several other scientific fields, such as: geology, hydrology, speleology, ecology, biology, paleoanthropology, paleontology, agriculture, animal husbandry, health, engineering, mining, and others. However, the explanation of important values only includes important values in geology, hydrology, paleoanthropology, paleontology, and archeology. The variables used in this zoning are as follows:

- The appearance of slope buckling in the topography around the complex.
- Rock units exposed on the surface
- Plotting of spring locations
- Administrative boundaries
- Land use boundary
- Land ownership boundaries
- Visibility to Wajak Cave and Song Gentong Cave complexes
- Land use
- Comparative study of the complete complex area

So that from the whole discussion, the final zoning limit in the study is Goa Wajak of 73,334 m² and at Goa Song Gentong of 39,191 m².



Figure 2. Zoning in Wajak Cave.

Source: Setiyabudi, 2019

3.4 Evaluation

3.4.1 Zoning Evaluation

The zoning evaluation in this context considers several key aspects that are deemed influential, as follows:

- Protection and Security

This aspect evaluates whether the existing zoning study provides adequate safety for both caves. Given the economic value of the caves, they are highly vulnerable to becoming future mining targets. However, the existing zoning study does not place significant emphasis on this issue. Additionally, the zoning study's designated area does not rule out the possibility that previous mining activities had already taken place within the region.

- Environmental Conservation

This aspect ensures the protection of the surrounding environment, which serves as the primary safeguard for both caves. In principle, the areas surrounding Goa Wajak and Goa Song Gentong are not directly adjacent to residential settlements, but they are located on land owned by local communities. As of the completion of the 2022 zoning study, the land around these caves was still being utilized by the community. Goa Wajak, for instance, is used as a venue for the annual August 17th ceremony, while the lower part of the area is planned for further community use. Additionally, a stone-cutting site is located at the base of Goa Wajak. Meanwhile, in front of Goa Song Gentong lies PT Marmer Indonesia, which increases the likelihood of the cave being affected by nearby mining activities.

- Monitoring and Maintenance

These aspects must be evaluated to ensure that the caves remain in a safe condition. Currently, the direct monitoring and maintenance of Goa Wajak and Goa Song Gentong fall under the jurisdiction of the local village authorities. As a result, these efforts remain insufficient. In the village-level administrative framework, the monitoring and maintenance of these caves are not yet considered a priority.

3.4.2 Policy Evaluation

Until now, there has been no specific policy for Goa Wajak and Goa Song Gentong. Both caves are still listed in the ODCB (Object of Alleged Cultural Heritage) registry in Tulungagung Regency. In 2024, they were proposed to be designated as Cultural Heritage at the regency level. Additionally, the policy regarding the zoning study process appears to be inadequate, considering that Goa Wajak and Goa Song Gentong were only included in Tulungagung Regency Regional Regulation No. 4 of 2023 on Spatial Planning for 2023–2043 in the year 2023. According to Undang-undang No. 11 Tahun 2010 on Cultural Heritage, the zoning study process must be conducted based on

established government regulations. Moreover, Goa Wajak and Goa Song Gentong have not yet been officially designated as Cultural Heritage sites.

The policies that should be implemented immediately by policymakers appear to be progressing very slowly. Since 2020, several coordination meetings have been held to discuss interim reports on the preparation of the academic manuscript proposal for the Tulungagung Regency Geopark to be submitted to the National Geopark. According to information published on the official website of BAPPEDA Tulungagung, there are ten cultural heritage sites planned to be designated as the Tulungagung Regency Geopark, including: Ancient Volcano of Mount Budheg, Telaga Buret Patahan, Underground River Cave Tenggar, Ganesa Marble Mountain Range, Lazuli Stone Mine Watu Ijo, Wajakensis Cave Complex (including Wajakensis Cave and Song Gentong Cave), Niyama Limestone Tunnel, Kedung Tumpang Lagoon Beach, Faulted Coastline of Sanggar Beach (Turtle Habitat), Tretes Waterfall on the Slopes of Mount Wilis. The Wajakensis Cave Complex, which includes Goa Wajakensis and Goa Song Gentong, is among the sites proposed for the Geopark designation.

3.4.3 SWOT Evaluation of Zoning Aspects

SWOT analysis is essentially a tool used for strategic planning to assess internal and external factors in any organization or project. The term refers to Strengths, Weaknesses, Opportunities, and Threats. Through this analysis, a project can set strategic objectives and plan to follow up based on the current conditions within it (Benzaghta et al. 2021, Puyt et al. 2020).

Basically, the main purpose of conducting this SWOT analysis is to systematically assess and evaluate internal and external factors, as well as to identify strengths and weaknesses, and to identify opportunities arising from threats. Threats can arise from both external and internal sources. The results of this analysis will then be used as a basis for more strategic decision-making, taking into account both weaknesses and strengths (Hazzan et al, 2017). Therefore, the application of SWOT analysis in this discussion is as follows :

Table 1. SWOT analysis.

SWOT ANALYSIS OF THE ZONING ASPECT	STRENGTH	WEAKNES
	<ol style="list-style-type: none">1. Both caves hold significant value.2. Both caves are included in Regional Regulation No. 4 of 2023 on Spatial Planning and Regional Areas of Tulungagung Regency 2023-2043.	<ol style="list-style-type: none">1. Many residents still believe that mining can be conducted even in areas close to the caves.2. There has been no official designation of the caves as Cultural Heritage sites.

		3. Both caves are part of future plans to be developed into a Geopark of Tulungagung Regency.	3. There has been no zoning determination in accordance with the spatial planning regulations of Tulungagung Regency.
	OPPORTUNITY	S-O	W-O
1. High stakeholder interest in the development of Cultural Heritage sites.	1. Planning various programs related to the preservation and further development of Goa Wajak and Goa Song Gentong.	1. Implementing strict sanctions as concrete evidence of the consequences of violating existing regulations.	
2. The presence of future programs to be implemented by Tulungagung Regency.	2. Striving to implement the programs developed by the relevant agencies.	2. Expediting the designation of Goa Wajak and Goa Song Gentong as Cultural Heritage sites.	
	3. Conducting further research to deepen useful information and enhance the value of Goa Wajak and Goa Song Gentong.	3. Immediately developing a new zoning study based on the latest government regulations.	
	THREAT	S-T	W-T
1. Lack of government attention to zoning violations committed by the community.	1. Establishing strict regulations regarding the zoning division of Goa Wajak and Goa Song Gentong.	1. Providing awareness and training to the local community about the importance of Goa Wajak and Goa Song Gentong.	
2. The caves will become increasingly damaged if left unattended and no immediate action is taken.	2. Immediately taking necessary designation actions and developing further conservation measures to prevent further damage.	2. Educating the community about the permitted boundaries for development.	

3.5 Recommendation

From the previous explanation, several aspects have been identified that need to be improved comprehensively. Therefore, the following recommendations can be provided:

3.5.1 Cultural Heritage Designation and Zoning

Referring to Undang-undang No. 11 Tahun 2010 on Cultural Heritage, the zoning system is determined by the Minister if the site has been designated as a National Cultural Heritage, by the Governor if it is a Provincial Cultural Heritage, and by the Regent/Mayor if it is located within a regency/city area. Therefore, before zoning determination, Goa Wajak and Goa Song Gentong should first be designated as Cultural Heritage sites.

Additionally, the zoning determination should consist of four zones: the core zone, buffer zone, development zone, and/or supporting zone. The boundaries of each zone within the zoning system should be clearly defined. The zoning study conducted in 2022 should be reviewed, considering the enactment of Tulungagung Regency Government Regulation No. 4 of 2023 on Spatial Planning and Regional Development of Tulungagung Regency as the basis for the zoning study. The updated zoning study must align with the newly established government regulations.

The following steps can be taken:

- a. Coordination with relevant agencies in the conservation process.
- b. Designation of Goa Wajak and Goa Song Gentong as Cultural Heritage sites of Tulungagung Regency to provide a clear legal foundation.
- c. Conducting a zoning study review based on the 2023 Tulungagung Regency Government Regulation.

3.5.2 Stakeholder

The government should take the following steps as further recommendations:

- a. Plan programs related to the management and development of Wajak Cave and Song Gentong Cave.
- b. Realize programs that have not been implemented
- c. Create strict sanctions along with regulations for those who violate regulations related to the preservation of related Cultural Heritage
- d. Creating protection zones based on Undang-undang No. 11 Tahun 2010 on Cultural Heritage
- e. Socialization to the surrounding community regarding the sustainability of Wajak Cave and Song Gentong Cave, so as to optimize all related aspects.

3.5.3 Community role in Conservation and Zoning

Increasing community human resources as a form of community consistency in carrying out maintenance and development that has been planned by policy makers. So that the community can be used during the realization process of the Tulungagung Regency Geopark. Steps that can be taken include:

- a. Maximizing the potential of the surrounding area of Wajak Cave and Song Gentong Cave.

- b. Debriefing the community about the Tulungagung Regency Geopark and the two caves as Cultural Heritage.
- c. Providing additional knowledge to the community and instilling the importance of the two caves to the community.
- d. Providing some responsibility to the community as a form of community participation related to the management of the two caves.

3.5.4 Marble Mining Countermeasures

Mining is still ongoing around the Wajak Cave and Song Gentong Cave areas. This has caused concern regarding the threatened existence of the two caves. Thus, steps that can be taken are

- a. Conduct socialization to mining actors around Wajak Cave and Song Gentong Cave regarding the limits of mining areas that can be carried out.
- b. Tightening the licensing process for mining companies.
- c. Making strict regulations related to legal and illegal mining around the cave area.

4. Conclusion

Goa Wajak and Goa Song Gentong have great potential for the future, as evidenced by the ongoing efforts to develop them into the Tulungagung Regency Geopark. Therefore, conservation efforts must be implemented immediately. Considering the existing issues surrounding Goa Wajak and Goa Song Gentong, the recommended conservation measures include the establishment of policies related to Cultural Heritage designation and zoning for both caves, active involvement from relevant policymakers, raising public awareness about the importance of Goa Wajak and Goa Song Gentong, and addressing marble mining activities in the surrounding areas.

5. References

Benzaghta, M.A., Elwalda, A., Mousa, M.M., Erkan, I. and Rahman, M. (2021). SWOT analysis application: An integrative literature review. *Journal of Global Business Insights*, (6.1), 55-73

BPCB SUMATERA BARAT. (n.d.). *Zonasi Sebagai Salah Satu Bentuk Perlindungan Cagar Budaya* . Retrieved June 16, 2024, from <https://kebudayaan.kemdikbud.go.id/bpcbsumbar/zonasi-sebagai-salah-satu-bentuk-perlindungan-cagar-budaya/>

Djaali, & Muljono, P. (2008). *Pengukuran dalam Bidang Pendidikan* . Grasindo.

Hazzan, O., Heyd-Metzuyamin, E., Even-Zahav, A., Tal, T. and Dori, Y. J. (2017). Application of Management Theories for STEM education: The case of SWOT analysis. Springer.

Ismanto. (2014). Evaluasi Hasil Belajar Pendidikan Agama Islam . *Edukasia* , 9(No. 2), 211–236.

Kasnowihardjo, G. (2010). Sekilas Tentang Sebaran Manusia Prasejarah Indonesia. *Papua*, 2(No.2), 1–13.

Litbang APP Bappeda. (2019, February 22). *Jejak-jejak Peradaban Purba di Goa Tenggar*. <https://bappeda.tulungagung.go.id/post/jejak-jejak-peradaban-purba-di-goa-tenggar>

Litbang PP Bappeda Tulungagung. (2020, June 18). *Upaya Tulungagung Menuju Geopark Nasional*.

Peraturan Pemerintah Pengganti Undang-undang No. 4 Tahun 2023 Tentang Tata Ruang dan Kawasan Kabupaten Tulungagung. (n.d.).

Prasetyo, C. D. (2015). *Fauna Prasejarah pada Situs Song Gentong (Studi Paleozoologi pada Temuan Fosil Fauna Hasil Ekskavasi Paleoantropologi di Desa Besole Kecamatan Besuki, Kabupaten Tulungagung, Jawa Timur)*. Universitas Airlangga.

Puyt, R., Lie, F., De Graaf, F. J. and Wilderom C. P. (2020) Origins of SWOT analysis. In *Academy of management proceedings*. Briarcliff Manor, New York. No. 1, 17416.

Simanjutak, Truman. (2011). Kehidupan Manusia Modern Awal di Indonesia: Sebuah Sintesa Awal. *Amerta*. Vol 29 No. 2. 1-17

Setiabudi, E., Trihascaryo, A., Koesbardiati, T., Suriyanto, R. A., & Murti, D. B. (2019). Konservasi Geologi Lokasi Fosil Vertebrata dan Manusia Purba, Daerah Tulungagung Selatan, Jawa Timur. *Jurnal Geologi Dan Sumberdaya Mineral* , 20(No. 4), 187–197.

Susanto, A. (2011). *Ekspedisi Geografi Indonesia 2011: Karst Gunungsewu* . Pusat Survey Sumberdaya Alam Darat .

Undang-undang No 11 Tahun 2010. (n.d.).