

Legal policy for the protection of the super priority tourist destination Borobudur Temple by using traditional tools with appropriate and environmentally friendly technology

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Abstract

Borobudur is a world cultural heritage site that has high historical, architectural and spiritual value. It is hoped that Borobudur Temple as a world cultural heritage can be enjoyed in the future-by-future generations. Apart from that, the development of Borobudur Temple tourism also has the potential to increase local income, create jobs and improve the welfare of the surrounding community. However, as a historical site that is vulnerable to environmental damage and degradation, the protection and preservation of Borobudur is important. Many factors can accelerate the damage to temple structures, so policies and awareness are needed to maintain their preservation. This policy refers to the use of appropriate and environmentally friendly technology for tourism efforts and maintaining the preservation of Borobudur Temple. The aim of this research is exploring information about the condition of Borobudur Temple in daily visits by tourists, the impact and conservation efforts formulated in government policy and analyze whether government policies are appropriate for efforts to preserve Borobudur Temple as a world heritage site. This research was conducted using qualitative research methods with a descriptive approach as the primary method and quantitative as a supporting method. This is due to maintaining the objectivity of the results. The results of this research are information on the condition of Borobudur Temple in daily life with tourist visits, the impact and conservation efforts formulated in government policy.

Keywords

Borobudur, Legal policies, Protection, Tourist destinations, Appropriate and environmentally friendly technology

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Introduction

Borobudur Temple is a world cultural heritage site that has high historical, architectural and spiritual value. After restoration II, Borobudur Temple has become increasingly visited by tourists, both from within and outside the country. The results of our previous research in 2019 showed that the Borobudur temple as a tourist icon in Magelang Regency had increased the number of tourists. The number of tourists in 2022 and 2023 will be more than 1.4 million [1]. This number of tourists has encouraged the economic, social and cultural development of the surrounding community, but on the other hand it has raised concerns about the preservation of Borobudur Temple as a result of various tourist behavior. Based on the Physical Carrying Capacity Study of Borobudur Temple, it was found that there has been an excess of visitors. compared to the carrying capacity of the temple [2]. This finding is one of the considerations for the government to issue Guidelines for the Use of Nationally Ranked Cultural Heritage Areas for Borobudur Temple, Mendut Temple and Pawon Temple for Tourism Purposes, which among other things regulates restrictions on temple visitors and several other provisions. Efforts to preserve Borobudur Temple are not limited to the temple building, but also the temple environment. As the historic site of the Borobudur temple is very vulnerable to environmental damage and degradation, the protection and preservation of Borobudur is very important [3]. The Borobudur Temple building is also affected by environmental changes, pollution and other environmental damage which can endanger the sustainability of the site [4]. Therefore, environmental protection is the key to ensuring the sustainability of Borobudur for future generations [4].

Method

This research is a type of empirical juridical research, or what is called field research, namely examining applicable legal provisions and what happens in reality in society. Empirical juridical research is legal research regarding the application or implementation of normative legal provisions in action at each specific legal event that occurs in society. This research was conducted using qualitative research methods with a descriptive approach as the primary method and quantitative as a supporting method. This is due to maintaining the objectivity of the results. Descriptive research is carried out to determine variable values independently between research data or to connect one variable with another variable. This type of research uses a sociological (socio-legal) approach which uses a descriptive approach to obtain information about the implementation of various regulations related to environmental conservation in tourist destinations and various problems in the field.

Results and Discussion

General explanation about Borobudur Temple

Borobudur Temple is one of Indonesia's cultural masterpieces located in Magelang Regency, Central Java. This temple is the largest Buddhist monument in the world and has been recognized as a World Heritage Site by UNESCO since 1991. Founded in the 8th to 9th centuries AD during the reign of the Syailendra Dynasty, Borobudur reflects a unique blend of art, religion and philosophy. shows the glory of Indonesian civilization in the past.

Architecturally, Borobudur was designed with the concept of a mandala, symbolizing the universe in Buddhist cosmology. This temple consists of ten levels, which are divided into three main parts: *Kamadhatu* (world of desire), *Rupadhatu* (world of form), and *Arupadhatu* (world of formlessness). Each of these parts symbolizes man's spiritual journey from worldly life to enlightenment. At its peak there is a large stupa which symbolizes ultimate freedom and enlightenment. This temple has around 2,672 relief panels decorating its walls, depicting various stories of Buddha's life, the law of karma, and moral teachings. These reliefs also reflect the daily life of ancient Javanese society, including agricultural activities, trade and art. With extraordinary detail, these reliefs demonstrate the highly advanced sculptural skills and building techniques of their time.

Borobudur was built using more than two million andesite stone blocks, which were assembled without using adhesive materials. This structure has remained strong for more than a thousand years, despite facing various challenges such as earthquakes and volcanic eruptions. Major reconstruction was carried out in the 20th century to preserve this temple from natural and human damage. As a spiritual center, Borobudur is still a place of worship for Buddhists, especially during Vesak celebrations. On this holy day, thousands of monks and Buddhists from various countries gather at Borobudur to carry out rituals and meditation. Apart from that, Borobudur is also a major tourist destination that attracts millions of visitors every year, both from within and outside the country.

The beauty and majesty of Borobudur lies not only in its architectural value, but also in the universal message conveyed by its reliefs and symbolism. Borobudur teaches the importance of harmony between humans, nature and spirituality. This temple is clear evidence of the glory of Indonesian culture and a world heritage that must be preserved for future generations. As a national icon and symbol of pride, Borobudur continues to be a source of inspiration and learning. Its existence reminds us of the importance of preserving culture and history, as well as respecting the universal values that underlie human life. With all its uniqueness and beauty, Borobudur Temple is a silent witness to the glory of the past which is still relevant today.

Causes of Borobudur Temple stone wear

Wear and tear of the stones at Borobudur Temple is one of the main challenges in efforts to preserve this historic site. As an ancient monument that has stood for more than a

thousand years, Borobudur has experienced damage caused by various natural and human factors. Among them:

1. Weather and climate factors

Borobudur is located in a tropical area that has high rainfall, humidity and fluctuating temperatures. Rainwater, especially those containing acid due to air pollution, accelerates the erosion process of andesite stone which is the main material of the temple. Water that seeps into rock crevices causes chemical and physical weathering, such as peeling of rock layers and the formation of moss and fungi. This process is exacerbated by extreme temperature changes between day and night, which trigger expansion and contraction in the rock, accelerating cracking.

2. Vegetation and microorganisms

The growth of moss, fungus and wild plants on the surface of the temple is also one of the main causes of stone wear. This vegetation penetrates the cracks in the rock, causing the cracks to widen and weakening the structure of the temple. In addition, the activity of microorganisms such as bacteria and algae triggers biochemical reactions that can gradually damage the stone.

3. Volcanic eruption

Mount Merapi, which is located not far from Borobudur, has erupted several times and threatened the existence of the temple. Volcanic ash from this eruption covers the surface of the temple, containing acidic compounds that can damage stone. Large eruptions such as those that occurred in 2010 produce highly corrosive volcanic ash, accelerating the degradation of andesite rock.

4. Human activities

Damage caused by human activities cannot be ignored either. In the past, many parts of the temple were stolen or damaged by artifact hunters. In addition, the increase in the number of tourists visiting Borobudur causes physical friction on the rock, both from direct touch and footprints that erode the relief and surface of the rock. Pollution from motorized vehicles around the temple area also contributes to the accumulation of dangerous chemicals that accelerate weathering.

5. Lack of care in the past

In previous centuries, Borobudur was abandoned and neglected. As a result, the temple stones were buried in soil and wild plants, which accelerated the damage process. It was only in the 19th century that this temple began to receive attention again, but the damage that had occurred was difficult to completely restore.

Government policy to handle and overcome damage to Borobudur Temple

The Indonesian government has taken various strategic policies to handle and overcome damage to Borobudur Temple as an effort to preserve this priceless cultural heritage. These policies involve a multidimensional approach, including aspects of

conservation, regulation, education and international collaboration. By focusing on long-term preservation, the government aims to ensure the site's sustainability as a symbol of the nation's history and culture. This long-term preservation is achieved by:

1. Conservation and restoration

Conservation policy is the main priority in preserving Borobudur Temple. The government through the Ministry of Education, Culture, Research and Technology (Kemendikbudristek) routinely carries out restoration and physical maintenance of temples. Stone cleaning is done using special techniques, such as using water steam to remove moss and fungus without damaging the stone structure. In addition, the drainage system has been improved to prevent water stagnation which can accelerate erosion. In terms of stone coatings, the government has adopted modern technologies, such as environmentally friendly microscopic protective coatings to protect stones from extreme weather and pollution. Apart from that, the use of appropriate environmentally friendly technology in the form of Upanat sandals which are used as footwear to climb up to Borobudur Temple is an effort to avoid wear and tear on the temple stones. Ongoing research is also conducted to understand weathering processes and find more effective conservation solutions.

2. Management of tourist areas

To reduce pressure caused by human activity, the government has limited the number of visitors who can climb the main structure of Borobudur. This policy aims to reduce direct friction on the rock and maintain structural stability. As an alternative, the government provides observation platforms around the temple to provide a tourist experience without compromising the preservation of the site. Apart from that, the Borobudur area has been regulated as a tourist zone equipped with supporting facilities, such as information centers, museums and organized tourist routes. This policy aims to direct visitors not to touch parts of the temple directly and increase awareness about the importance of preserving this site.

3. Education and awareness campaigns

The government is intensively conducting awareness campaigns among the public, especially tourists, about the importance of protecting Borobudur. Through educational programs, such as tour guide training and community activities, the public is invited to understand the historical, cultural and spiritual value of this temple. In addition, the government involves schools and universities in research and community service programs related to the preservation of Borobudur Temple. This effort aims to create a young generation who cares about cultural heritage.

4. Regulation and legal protection

As a world heritage site, Borobudur Temple is protected by national law. The government issued strict regulations to prevent activities that could damage temples, such as illegal excavation, vandalism or theft of artifacts. The temple area is also

designated as a no-pollution zone, where motorized vehicles are restricted to reduce the impact of air pollution. To protect and preserve the Borobudur Temple Complex as one of Indonesia's national cultures and to provide maximum benefits for the prosperity of the people, Presidential Regulation Number 101 of 2024 concerning Management of the Borobudur Temple Complex was issued.

5. International collaboration

The government collaborates with international bodies such as UNESCO to implement sustainable conservation programs. This collaboration includes technical assistance, funding, as well as knowledge exchange on modern conservation techniques. On a national scale, the government also involves local communities through cultural tourism-based economic empowerment programs.

Conclusion

The government's policy in dealing with damage to Borobudur Temple reflects its commitment to preserving this cultural heritage. By integrating aspects of conservation, regulation, education and collaboration, the government is trying to keep Borobudur so that it remains a symbol of past glory that is relevant in the present. The use of modern technology that is environmentally friendly and appropriate in the form of Upanat Sandals is a major effort to protect Borobudur Temple from damage to its rocks due to wear and tear caused by the footwear of the very large number of visitors from day to day. Preserving Borobudur Temple is not only the responsibility of the government, but also the entire community as owners of this cultural heritage.

References

1. Badan Pusat Statistik Kabupaten Magelang Jumlah Pengunjung Obyek Wisata Candi Borobudur Menurut Asal Wisatawan Dan Bulan Di Kabupaten Magelang, 2023 2023.
2. Wahyuningsih, I. Evaluasi Dampak Pemanfaatan Candi Borobudur Sebelum Dan Pasca Pandemi: J. Konserv. Cagar Budaya 2022, 16, 100–114, doi:10.33374/jurnalkonservasicagarbudaya.v16i2.301.
3. Smith, M.K. Section B: Theoretical Frameworks and Concepts in Tourism and Sustainability: 13. Tourism and Cultural Change; 2015; ISBN 9780415662482.
4. Buckley, R.C. Sustainable Tourism: Theory and Practice --- REVIEW. Ann. Tour. Res. 2007, 34, 269–270.