

CONSERVATION AND MANAGEMENT PLAN AT A PREHISTORIC ARCHAEOLOGICAL SITE: THE CASE OF THE NIAH CAVES IN SARAWAK, MALAYSIA

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Abstract: The Niah Caves are an important archaeological site that supports a resident population and is host to a large and growing number of visitors. Close monitoring, strict regulations, and careful management will be required in the long term to avoid pressures and threats from urban expansion, plantations, resource use, village growth, excessive tourist infrastructure and use, and service development. However, the absence of a formally written conservation and management plan prior to 2022 has left the heritage conservation and management of the Niah Cave site insufficient in addressing its management challenges. Hence, this paper analyses the conservation and management plan for the site through systematic observation, site analysis, and stakeholder interviews. The research focuses on documentation and recording, assessing the site's importance, identifying all factors and issues, defining management policy, selecting management strategies, and monitoring and reviewing the plans for the site. The study aims to contribute to the conservation and preservation of the Niah Caves as a national park in Sarawak. Emphasis is placed on prioritising the preservation and management of archaeological sites and advocating for comprehensive planning and sustainable management practices for the conservation of cultural heritage.

Keywords: Archaeology, conservation, management, Niah Caves, sustainability.

Introduction

Within the subcategory of archaeological site conservation, key concepts, such as archaeological site, cultural heritage or property, cultural heritage management, monument, preservation, reconstruction, conservation and conservation of archaeological sites, are fundamental and require attention (Matero, 2018). Conservation encompasses all activities aimed at maintaining a place's cultural significance, which may include aesthetic, historic, scientific, social or spiritual values for past, present, and future generations. Cultural significance is embodied in the place itself, its fabric, setting, use, associations, meanings, records, and related places and objects (Vinodan & S. Meera, 2021). Conservation efforts should leverage all knowledge, skills, and disciplines which can contribute to the study and care of the

site. The goal of a conservation and management plan is to ensure that every archaeological site is identified, protected, and managed for maximum longevity. The protection and promotion of cultural property and sites must be carried out according to the specific logistical case, urbanisation, the specific geographical situation and the availability of resources and skills, depending on a rational and balanced attitude towards history, identity, and readiness of the country where the heritage and cultural site are located, facilitating a seamless transition from the past to the future (Lorusso *et al.*, 2016).

In Sarawak, the protection and management of archaeological sites as the state's cultural heritage fall under the purview of the Sarawak Museum Department. Although the Sarawak

Museum was established towards the end of the 19th century, the formal management of historical sites in the state can be traced back to 1947, following the damage sustained by heritage sites during the Second World War. Subsequently, the Antiquities Ordinance 1954 was enacted in Sarawak, followed by the Sarawak Cultural Heritage Ordinance in 1993, which was later amended in 2019. This ordinance aims to establish legal penalties for the destruction, damage, or looting of antiquities, promote the creation of historic and scientific national monuments, and to allow for the examination and excavation of archaeological sites. The Niah Caves, housing numerous important archaeological sites within the Niah National Park, also fall under the protection and management purview of the Sarawak Museum Department, alongside other agencies as discussed in the next section.

Current Conservation and Management Plan

The Niah Caves archaeological site was proposed as a World Heritage Site status to the United Nations Educational, Scientific and Cultural Organisation. Initial efforts involved meticulous curation for inclusion in the tentative list, showcasing Niah Caves' historical and geological significance and indicating its potential for global recognition. Collaboration with the World Heritage Centre in developing the nomination dossier highlighted the unique cultural and natural importance of the caves. The dossier underwent review by advisory bodies, and following the second defence nomination in May 2024 and subsequent evaluation, it was announced in June 2024 that the Niah Caves will be officially designated as a World Heritage Site in July 2024.

The preservation of archaeological heritage at the Niah Caves is a joint endeavour led by the Sarawak state government, involving agencies such as the Sarawak Museum Department and Sarawak Forestry Corporation. These partnering entities work together in a coordinated manner, pooling their expertise to build a comprehensive strategy aimed at ensuring the complete

conservation of cultural and natural assets within the site's boundaries.

The Sarawak Museum Department plays a crucial role in archaeological research and documentation. The activities encompass methodical excavations, preservation of artefacts, and thorough documentation of discoveries. Through the process of elucidating the historical relevance of a particular place, academics make a valuable contribution towards fostering a more comprehensive understanding and facilitating effective management practices. Additionally, the Sarawak Museum Department actively promotes public awareness of the site's significance. Educational programmes, guided tours, and informational materials are designed to engage visitors and cultivate a sense of responsibility towards the conservation and safeguarding of the sites. This approach aims to enhance visitor experience, while mitigating any possible harm to the site.

Meanwhile, the Sarawak Forestry Corporation focuses on implementing conservation initiatives, such as safeguarding archaeological remnants, geological configurations, and cultural objects within the caves. Conservation methods include implementing controlled access protocols, monitoring humidity levels, and conducting regular preventative maintenance on structures. The corporation also plays a prominent role in conserving the natural environment surrounding the archaeological site, which involves protecting natural ecosystems, conserving biodiversity, and monitoring potential threats.

The management and conservation strategy implemented at the Niah archaeological site serves as an example of a cooperative and multifaceted approach. The Sarawak Museum Department is mainly dedicated to archaeological research, documentation, and public engagement, while the Sarawak Forestry Corporation is responsible for safeguarding the environment and managing tourism activities. Through these combined efforts, the unique history of the site will be preserved for future generations. By employing a multifaceted approach that includes scholarly inquiry,

awareness-raising efforts, environmentally friendly practices, and active involvement of the local community, the proposed strategy ensures the preservation of the Niah archaeological site as a dynamic gateway to historical eras while also protecting its authenticity and the surrounding natural ecosystem (Moussa, 2023).

The management and protection of the Niah Caves archaeological site have faced significant obstacles, primarily due to limited collaboration with other stakeholders, especially the local community (Chia, 2018). This lack of local involvement in archaeological and heritage management work is a common observation in Malaysia (Goh, 2014). The limited engagement of the local community in decision-making processes is identified as a primary factor contributing to the lack of cooperation. Residents living near the Niah Caves have expressed feeling inadequately engaged and consulted in matters related to their management. This has resulted in a sense of disconnection from ongoing conservation efforts, hindering their comprehensive understanding of the significance of such actions. Effective collaborative efforts depend on clear and open communication channels. Misunderstandings and restricted collaborations can arise due to language difficulties or inefficient communication channels between conservation officials and the local community. The level of awareness within the local community regarding the potential benefits associated with proficient management and conservation practices is not yet comprehensive. Without empirical data demonstrating the potential improvements to quality of life, economic prospects, or cultural preservation, there may be reduced interest in engaging in these efforts. Local communities often prioritise immediate economic needs over long-term environmental objectives. Due to their economic reliance on activities such as tourism and resource exploitation in the region, local residents tend to oppose natural conservation policies that they regard as detrimental to their income. The level of engagement and collaboration within a local community is

influenced by cultural ideas, traditions, and social conventions, which often lead to conflicts with conservation efforts, resulting in resistance or limited engagement from local communities. The absence of a well-defined legal framework or standards for collaboration and resource sharing between conservation organisations and the local community can impede the effectiveness of their collaborative efforts. In the absence of comprehensive educational initiatives and awareness campaigns, local residents may lack a complete understanding or recognition of the archaeological site's historical, cultural, and scientific significance, resulting in disinterest or apathy (Yamabhaia *et al.*, 2021).

In the current situation, the lack of explicit policies outlining the responsibilities of each party involved has exacerbated the challenges in managing the situation. Clear and precisely delineated policies play a crucial role in enhancing efficiency, reducing disputes, and upholding principles of responsibility. Implementing these policies within the Niah community has led to confusion and overlapping duties. This phenomenon hinders decision-making processes and results in inefficiencies, potentially compromising the effectiveness of conservation and management efforts. Without well-defined parameters, decision-making procedures may become convoluted and prone to discord. Stakeholders' lack of understanding regarding the decision-making authority has resulted in significant obstacles and delays in executing essential site conservation measures. The absence of clear guidelines also leads to duplication of efforts, where multiple stakeholders inadvertently engage in similar activities. This inefficiency not only wastes resources, but also hampers the overall progress in conservation efforts. Neglect or inadequate management of specific site sections due to overlapping tasks has negative implications for safeguarding cultural or natural attributes and sparks disputes over resource distribution, including financial, personnel, and technical assistance. This presents a major challenge to adopting efficient management systems.

The conservation and management of the Niah Caves face challenges, exacerbated by incidents of vandalism. Excavations play a crucial role in the discovery of concepts and understanding of historical events. However, they also present a paradox as the act of uncovering these valuable elements can inadvertently contribute to the site's deterioration. Excavation, silt removal, and modifications to adjacent areas can intensify the natural degradation processes the site is susceptible to. This is particularly evident when it comes to the preservation of the architectural and cultural legacy inherent within the caves. Sites of immense archaeological significance, offering insights into prehistoric human life, have sometimes suffered unintended destruction. The delicate balance between exploration and preservation is evident here. While excavations aim to unveil the past, they must proceed cautiously to preserve the sites' integrity. The consequences of accidental harm extend beyond physical structural damage. Each archaeological site is a treasure trove of knowledge, offering glimpses into past communities' lives, activities, and civilisations. Accidental compromises to these sites disrupt the wealth of information they hold. Fragile artefacts, intricate inscriptions, and subtle contextual clues that shed light on human evolution and cultural dynamics are also at risk of distortion or loss.

The authors' field surveys from 2020 to 2022 revealed persistent management issues in many of the archaeological sites within the Niah Caves, particularly concerning local heritage awareness and stakeholder participation. Consequently, this study proposes an all-encompassing strategy for conservation and management, consisting of a structured procedure that includes several key steps: (1) Documenting and recording the site; (2) assessing the significance of the site; (3) identifying all factors and issues; (4) defining management policy; (5) choosing management strategies; and (6) monitoring the results and reviewing the plan. As elaborated further in the discussion of the findings, these steps form a sequence of interconnected procedures, executed

coherently, culminating in the formulation of a comprehensive site management strategy. This framework provides a systematic approach to examining circumstances and formulating an efficient solution aimed at preserving the cultural significance of the given location.

Materials and Methods

Location and Description of the Study Site

The Niah Caves are located in the northern part of the state in Miri, Sarawak (Figure 1). This cave system comprises several caves within the Niah-Subis limestone complex. Among the recognised caves within the complex are Trader's Cave, West Mouth, Lobang Tulang, Painted Cave, Lobang Angus, Lobang Bulan, Lobang Semput, and Lobang Tahi Menimbun (Husain, 1958).

The Niah Caves are a well-known prehistoric site not only in Malaysia, but throughout the world (Harrison, 1970). Its importance to the study of early human habitation in Southeast Asia, particularly in Sarawak, has meant that the Niah Caves have been continuously explored and excavated by local and international archaeologists since the 1950s up to the present day. The preceding archaeological studies conducted at the Niah Caves and some of the noteworthy discoveries will be further discussed in the "Results and Discussion" section later.

Data Collection

We adopted a qualitative research approach to clarify the preservation and management plan at the site. The study employed on-site observation through a visit to gather first-hand information about the archaeological heritage site of the Niah Caves. Additionally, a literature study was conducted to gather further information about past archaeological studies conducted at the site and their findings. This research also used unstructured and semi-structured interviews with selected experts and members of communities in the Niah Caves area to delve deeper into specific topics or issues by exploring



Figure 1: Location of Niah Cave Archaeological Sites (Curnoe *et al.*, 2017)

the experiences, thoughts, and opinions of the interviewees. This research did not include a large sample of respondents; there were a total of 16 respondents (Table 1).

The unstructured interviews provided a great deal of specific and in-depth information due to their open-ended nature. In contrast, semi-structured interviews (Table 2) offered a balanced mix between structure and flexibility,

allowing for a more in-depth investigation of the interviewee’s thoughts and experiences while keeping some degree of consistency in the data collected. Both types of interviews proved valuable in gathering insights into individual’s attitudes, beliefs, and experiences, aiding the researchers in understanding the motivations, thoughts, and emotions influencing people’s behaviour and decisions.

Table 1: The list of research respondents

Respondent 1: Curator, Sarawak Museum Department
Respondent 2: Staff in Archaeological Section, Sarawak Museum Department
Respondent 3: Staff in Archaeological Section, Sarawak Museum Department
Respondent 4: Staff in Archaeological Section, Sarawak Museum Department
Respondent 4: Staff in Archaeological Section, Sarawak Museum Department
Respondent 6: Niah National Park Warden
Respondent 7: Staff in Niah National Park
Respondent 8: Staff in Niah National Park
Respondent 9: Staff in Sarawak Tourism Board
Respondent 10: Staff in Sarawak Tourism Board
Respondent 11: Staff in Sarawak Tourism Board
Respondent 12: Foreigner Researcher
Respondent 13: Local Researcher
Respondent 14: Head of the Village
Respondent 15: Villager
Respondent 16: Villager

Table 2: List of interview questions

No.	Respondent
Questions to the agencies involved	
1	What role do your agencies play in relation to the Niah Caves archaeological site?
2	What is your opinion on the current management plan for the Niah Caves archaeological site?
3	Is there any collaboration between your agency and researchers or communities at the archaeological site? What is the reason for the cooperation?
4	What are your agency's plans regarding the Niah Caves archaeological site?
Questions to the researchers	
1	What is your current research regarding the Niah Caves?
2	Why are you interested in archaeological research in the Niah Caves?
3	Why are the Niah Caves one of the most important sites in Southeast Asia?
4	What is the appropriate management practice for Niah Caves?
Questions to the local communities	
1	Are you interested in the cave activities?
2	What is your role as village leader in relation to activities affecting the Niah Caves?
3	Do you participate in the management practice at Niah Caves?
4	Has the Sarawak Museum Department entrusted you with monitoring the Niah Caves?
5	What significance does the archaeological site have for the communities nearby?

Results and Discussion

Documenting and Recording the Site

Documenting and recording a site are a meticulous and systematic process that involves the collection of a wide array of information, data, and tangible evidence to capture the fundamental nature and importance of the site. The primary objective of this undertaking is to ensure the preservation of the historical, cultural, and physical integrity of the site for current and future generations. This practice holds particular significance within the discipline of archaeology, as it establishes the fundamental basis for deciphering historical mysteries and ensures the enduring relevance of the archaeological site.

The process of documenting and recording the Niah Caves archaeological sites encompasses a wide range of activities that are focused on creating a comprehensive and intricate portrayal of the site's various characteristics. These include drawing upscaled maps and plans, visual documentation such as images and videos, and collecting, cataloguing, studying, and preserving samples, artefacts, and materials

like pottery fragments, implements, adornments, and organic remnants.

Initially, the documentation and recording of the Niah Caves site contributed to the construction of the historical narrative of the location, providing valuable insights into its development, the communities that inhabited it, and their cultural customs. Additionally, it serves as a conservation method, preserving the inherent features of the site from the effects of time, natural decay, and human interference. Furthermore, thorough documentation ensures that the knowledge gained from studying the site available accessible to scholars, researchers, and the public, promoting continuous learning and appreciation.

The Niah Caves have attracted scholarly attention since the mid-19th century when naturalist Alfred Russell Wallace visited Sarawak in 1855 to collect biological specimens. While in Sarawak, Wallace heard about the Niah Caves but was unable to explore

the caves. In 1873, A. Hart Everett explored the Niah Caves in search of the “missing link” between apes and humans, but he found only recent burials. Nevertheless, since the 1950s, many archaeological investigations have been conducted at the Niah Caves by local and foreign researchers to enhance the knowledge of prehistoric life at the site.

The earliest archaeological investigations at the Niah Caves were conducted by Tom Harrisson and the Sarawak Museum in 1954, with excavations at the West Mouth of Niah. These excavations would continue until 1967, encompassing not only the West Mouth but also other cave mouths like Gan Kira, Lobang Tulang, Lobang Hangus (or Lobang Angus) and Kain Hitam. The findings from these excavations have been extensively reported in numerous publications by Harrisson and his collaborators (T. Harrisson, 1958, 1966, 1967, 1970; Brothwell, 1960; B. Harrisson, 1965, 1967, 1968; B. Harrisson & T. Harrisson, 1968; Harrisson & Medway, 1967). Notably, these archaeological investigations revealed evidence of Paleolithic, Neolithic, and Metal Age habitation and burial sites within the Niah Caves. One of the most renowned archaeological discoveries from Niah, the Deep Skull, dated approximately 35,000 years ago, was discovered in 1958 (Brothwell, 1960; Curnoe *et al.*, 2016).

Zuraina Majid conducted further archaeological investigations at the West Mouth in 1977 on the pre-pottery layers to clarify the stratigraphic uncertainties related to the Pleistocene occupation with new carbon dates and to analyse the stone tools from the Harrisson excavation. Majid’s excavations recovered materials such as stone tools, faunal (bone and shell) and botanical remains, and ceramics. The analyses of these materials contributed to establishing a prehistoric cultural sequence at the West Mouth that potentially dates back to as early as 40,000 years ago and occurred in five phases based on the changes in artefact types (Majid, 1982).

From 2000 to 2004, a team of international researchers from the Niah Caves Project led by

Graeme Barker from the University of Cambridge conducted archaeological investigations at the caves. Their primary objectives were to re-examine the cave stratigraphy, establish the climatic and ecological context of human activities, and re-analyse the Harrisson finds (Barker *et al.*, 2001; 2002; 2003). This multidisciplinary effort aimed to address questions surrounding the arrival of modern humans in Southeast Asia, the adaptations of early modern humans to rainforest environments, and the transition from hunting-gathering to farming practices. The overall results of the Niah Caves Project have been published in two edited volumes (Barker, 2013; Barker & Farr, 2016).

In 2007 and 2008, a team of researchers from Universiti Sains Malaysia and the Sarawak Museum, led by Stephen Chia, conducted excavations at Kain Hitam Cave. These excavations recovered Neolithic period human burials, pottery, and faunal and mollusc assemblages (Bujeng & Chia, 2009). Besides archaeological excavations, studies on the cave paintings at Kain Hitam (or the Painted Cave) were also conducted (Szabo *et al.*, 2008; Hoerman, 2016). Furthermore, other discoveries related to rock art in Niah have been reported as well (Tacon & Sauffi, 2019; Tacon *et al.*, 2019).

In recent years, excavations have also taken place at Trader’s Cave in Niah, which contains wooden structures constructed and used in some cases by bird’s nest traders until the 1980s. These excavations have uncovered evidence of occupation and human activities dating to as far back as 60,000 years ago (Curnoe *et al.*, 2018).

In summary, the process of archaeological investigation and documentation at the Niah Caves has extended for more than 100 years and has observed notable transformations. The site’s historical, cultural and chronological significance has been revealed through the diligent work of numerous scholars, who have transitioned from a lack of detailed documentation in the beginning to a current focus on meticulous recording. The collaborative efforts shed light on the extensive historical significance of the Niah Caves, contributing to our comprehension of the past

and informing the strategies for preserving and managing this invaluable cultural asset.

Assessing the Significance of the Site

Assessing the relevance of a site is the evaluation of its historical, cultural, architectural, scientific, or aesthetic importance or worth (McKercher & Ho, 2006). This procedure determines if a site qualifies for protection or recognition, such as designation as a national historic landmark or inclusion on the list of World Heritage sites. Typically, appraising the relevance of a place entails reviewing existing data, conducting appropriate research, and speaking with subject matter experts. The evaluation results can be used to inform decisions regarding the site's preservation, administration, and interpretation (Gallou & Fouseki, 2019).

The Niah Caves have been a focal point of archaeological research, leading to the discovery of artefacts dating back to ancient times. The discoveries have significantly enhanced the cultural value of the location and added to its aesthetic appeal. Particularly noteworthy are the Painted Caves, which have revealed intricate wall paintings alongside findings such as ceramics, beads, and stone tools. These artefacts not only showcase the artistic capabilities of the prehistoric inhabitants but also provide valuable insights into the technological advancements of their respective time periods. They shed light on the diverse range of human activities and occupations that once thrived in the area. Furthermore, these remnants from the past offer evidence of the spiritual beliefs and existential challenges that shaped the prehistoric era.

The stone tools unearthed in the Niah Caves have garnered significant attention as they depict cultural evolution. Being conscious of multiple epochs facilitates the identification of a historical continuum in categorising these tools. The archaeological remains found in the lowermost strata of the site are of great significance as they provide evidence of human manual dexterity during the Palaeolithic era. These remnants include fragments and primitive tools, which are indicative of the first manifestations of this skill.

Advancing chronologically, the examination of stratigraphic layers unveils the existence of remnants originating from the Mesolithic era. The distinguishing characteristic of these relics is in the presence of flakes and edge-ground pebbles or cores, which serve as evidence of a refined approach to tool production. This progresses in the Neolithic period, during which the collection encompasses highly refined stone tools and even incorporates artefacts from the metal age. Each of these items serves as evidence of the development of human ingenuity and cultural achievement (Barker *et al.*, 2002). The collection of artefacts presented here serves to enhance our understanding of prehistoric ways of existence, while also contributing to the wider discourse on the history of humanity. The recording and protection of these artefacts as part of the conservation and management strategy for the Niah Caves site demonstrate a commitment to preserving our collective cultural legacy.

The Niah Caves sites are of scientific significance due to their provision of valuable data pertaining to the environment, geomorphology, climate, biology, zoology, and ecology. This makes the caves suitable for study, education, and the generation of knowledge (Faggi *et al.*, 2023). For instance, knowledge of the ecology contributes to a deeper comprehension of the cave-infill deposits, which in turn represent both natural and cultural processes (Barker & Reynolds, 2016). The Niah Cave site holds considerable scientific and environmental importance, emphasising the necessity for conservation efforts to protect its geological formations, sediment layers, and the rich array of flora and fauna associated with it. The management plan places significant importance on implementing measures to address soil erosion, regulate tourist access, and monitor environmental changes. In addition, establishing collaborations with scientific institutions to facilitate ongoing research endeavours contributes to the sustained improvement of the site's scientific quality.

Furthermore, the excavation of the Niah Caves site has yielded significant historical

importance by establishing a tangible link to the past. The site illustrates the living environment of early Pleistocene humans in Sarawak and has served as a location for nearly uninterrupted human habitation from the Palaeolithic era till the 19th century. The discovery of the Deep Skull, estimated to be 40,000 years old, has significantly elevated the Niah Caves' status as a crucial location in the study of human civilisation history (Curneo, *et al.*, 2021). The site has provided data pertaining to the historical record of human activity within the cave, considering its broader geographical and cultural setting, spanning from the initial habitation to the contemporary era (Majid, 1982). The proposed conservation strategy will prioritise the safeguarding of antiques, wall paintings, and other cultural remnants to ensure the preservation of their originality and overall condition. Interpretive programmes hold potential as educational tools for visitors, offering into the impact of a site on cultural practises and heritage.

The Niah Caves have also made a significant social contribution to contemporary civilisation. The concept incorporates various dimensions of heritage, including cultural, spiritual, educational, and emotional aspects. Additionally, it explores the role of heritage in fostering community identity, pride, and cohesion. In the realm of archaeological heritage management, incorporating social values is essential to effectively administer heritage resources, thereby fostering community benefits and strengthening historical ties. Incorporating the participation of local communities and stakeholders in the decision-making process, facilitating avenues for educational initiatives and public involvement, and demonstrating due regard for the cultural and spiritual values of heritage sites have been identified as essential components (Barker *et al.*, 2003). The importance of incorporating local communities into the conservation and management efforts is exemplified by the social significance ascribed to the Niah Cave site. The implementation plan should include the active engagement of community members in decision-making

processes, interpretive endeavours, and educational programmes. Empowering local residents to take ownership of preservation efforts fosters a common sense of pride and shared accountability.

Moreover, the Niah Cave possesses economic significance stemming from the administration and utilisation of its archaeological resources. This encompasses the generation of employment opportunities, the expansion of the tourism sector, and the enhancement of the local economy through the trade of heritage-related products and services. The Niah Caves archaeological site can attract tourists, create jobs in the tourism sector, and generate financial benefits for the local populace. The commercialisation of heritage-associated merchandise, encompassing items such as mementoes, literature, and instructional resources, has the potential to contribute positively to the regional economy. Furthermore, the process of excavating, preserving, and interpreting archaeological sites has the potential to create job opportunities and stimulate economic development within the construction and cultural heritage sectors (Maksić *et al.*, 2018). The management plan may place emphasis on the adoption of responsible and sustainable tourism practises with the objective of producing economic advantages for the local community. The potential allocation of cash generated by guided tours, heritage-related items, and visitor amenities can contribute to the preservation of natural and cultural resources, as well as support activities aimed at promoting community growth.

In order to effectively preserve and manage the Niah Cave site, it is crucial to employ an integrated approach that evaluates and harmonises the diverse values linked to the site. One plausible strategy involves implementing visitor regulations that seek to mitigate the ecological consequences while concurrently enhancing the overall visitor satisfaction. The use of interpretive signs and guided tours can convey knowledge to visitors regarding the historical, scientific, and cultural significance

of a location, thereby enhancing its educational and commercial value.

Monitoring and adaptation are important for site management, as they encompass routine evaluation of the site's condition and the assessment of the efficacy of adopted management strategies. By closely monitoring changes in the physical state of the site, observing visitor behaviour, and assessing community engagement, adjustments may be made to the management plan to address emerging challenges and use potential opportunities. The inherent values linked to the Niah Cave archaeological site form the fundamental basis for a holistic approach to the preservation and administration of the site. The plan ensures that preservation activities align with the historical, cultural, scientific, social, and economic significance of the site, thereby conserving its integrity and providing substantial benefits to both the local community and tourists.

Identifying All Factors and Issues

Implementing a conservation and management plan for an archaeological site necessitates accurate identification and a comprehensive understanding of all factors and challenges influencing the site. Conducting interviews with local communities and key local authorities, including the Sarawak Museum Department and the Sarawak Forest Service, has provided crucial insights into the factors and issues surrounding the Niah Cave archaeological site.

During the interview session with representatives from the Sarawak Museum, it was evident that significant emphasis has been placed on the administrative aspects of the Niah archaeological site. Several crucial challenges were identified, underscoring the need for effective measures to ensure the site's sustained maintenance and protection. The primary focus emphasised the importance of successfully executing a comprehensive management strategy, which entails clearly defining objectives and developing a detailed action plan. It was noted that alignment with the intended

objectives of the site and the safeguarding of its historical and cultural importance are crucial aspects that require attention.

Moreover, the implementation of a formal and thorough management agreement for the Niah Caves archaeological site was considered essential, holding significant potential for substantial benefits. Such an agreement would establish a well-organised framework for managing various facets of the site's operations, including conservation, maintenance, visitor management, and community engagement. Collaboration with pertinent stakeholders, such as local communities, government agencies, and historical specialists, was highlighted as crucial for consolidating resources, knowledge, and expertise to comprehensively enhance the site.

Furthermore, it was emphasised that a pedagogical methodology is necessary for individuals tasked with overseeing and administering the archaeological sites of the Niah Caves. Educating them about the site's inherent qualities, unique requirements, and future prospects was identified as a means to foster a sense of ownership and a deeper understanding of the significance of their roles. Additionally, ensuring consistent and sustainable resources, including financial, human capital, and infrastructure support, was identified as essential for the successful implementation of the management strategy.

Processes for ongoing monitoring and periodic review were also deemed critical to maintaining the relevance and effectiveness of the management plan. Regular evaluations and adjustments based on new knowledge or changing circumstances were highlighted as necessary to ensure the plan remains adaptable to the evolving needs of the Niah archaeological site. Finally, it was acknowledged that modern information and communication technology, particularly geographic information systems and the Internet, can provide powerful tools for managing, documenting, and promoting the site. Leveraging these technologies can enable efficient data collection, analysis, and

dissemination, thereby improving the overall administration and implementation of the management plan.

The Sarawak Forestry Department mentioned that the issue of risk management was a key concern in ensuring the preservation and protection of the Niah Caves archaeological site. Proactively identifying and establishing mechanisms to avoid or mitigate risks are essential to ensure their long-term viability. Currently, risk management within the Niah Caves archaeological site is primarily focused on certain individual elements, leaving a significant gap in a comprehensive site-wide risk assessment. This gap is particularly evident when it comes to preserving the outstanding universal values of the site. A comprehensive assessment of both existing and potential risks can serve as a basis for immediate risk mitigation strategies, as well as for the formulation of contingency plans for potential future disasters. It is important to recognise that risk management is a shared responsibility of many people, organisations and individuals (Svensson *et al.*, 2023). In addition, risks to archaeological site are not limited to physical threats. There is a subtle danger that comes from complacency, when a lack of vigilance about the health of the site can gradually undermine its overall health. In addition, risks may arise from political and administrative changes that may jeopardise the continuity of commitments to fulfil the commitments set out in the World Heritage Convention. As the socio-political landscape evolves, it becomes crucial to work steadfastly to preserve the labelled site. In essence, effective risk management for the Niah Caves archaeological site requires a comprehensive and collaborative approach. Identifying and managing risks of a physical, environmental or administrative nature requires constant vigilance and strategic planning to ensure the continued protection of the site and the preservation of its outstanding universal values.

The delineation of boundaries around archaeological sites in Sarawak, particularly

the Niah Caves archaeological site, emerges as a critical concern among local communities and key authorities. The absence of specific legislative frameworks governing this aspect poses significant challenges, particularly in ensuring the utmost protection for the site's integrity, its outstanding universal values, and the surrounding environment amid burgeoning developmental pressures, notably concentrated within buffer zones. The complexity of the situation is further compounded by the presence of diverse populations with distinct racial and cultural backgrounds in the region, presenting obstacles to meaningful involvement and understanding of the site's significance. Additionally, the potential benefits of the Niah Caves for local communities remain largely unexplored, highlighting missed opportunities for fostering connections and enhancing knowledge. Effective monitoring is identified as paramount for the successful implementation of the management plan, yet current monitoring efforts suffer from fragmentation and lack of coordination within the national planning system, underscoring the urgent need for a robust and systematic monitoring framework. Addressing these issues requires a comprehensive strategy that reconciles conservation and development imperatives, ensuring the preservation of the site's historical and cultural significance for future generations.

In summary, the combined findings of the Sarawak Museum, the Sarawak Forest Service, local communities and key local authorities highlight the complex challenges involved in the management and conservation of the Niah Caves archaeological site. Administrative intricacies, the dynamics of risk management, the complexity of delineating borders, and the need for local community engagement all combine to underscore the complexity of this endeavour. Addressing these challenges requires collaborative, adaptive, and comprehensive approaches that ensure the preservation of the historical, cultural, and global significance of the site for present and future generations.

Defining Management Policy

Archaeological sites are frequently regarded as valuable cultural resources due to their ability to showcase the historical and cultural significance of a particular area or society. Hence, the development of a comprehensive management programme for these sites is imperative to guarantee their conservation and preservation for the benefit of future generations. The formulation of a management plan for an archaeological site plays a crucial role in assessing how the cultural significance of the site can be preserved throughout both the immediate and extended periods. This process necessitates a comprehensive evaluation of many constraints, challenges, prospects, and circumstances that warrant careful study. The establishment of a robust and all-encompassing policy framework is crucial to effectively tackle the challenges encountered in the administration and safeguarding of the Niah Caves archaeological site. The primary aim of this technique is to address the intricate obstacles that occur due to a lack of collaborative behaviour, inadequate communication, overlapping responsibilities, and unintentional harm. These aforementioned factors jointly hinder the effective preservation and management of this culturally and historically significant site.

The integration of community engagement and collaboration is vital within the context of the management policy (Wu *et al.*, 2021). The primary aim of this strategy is to provide a complete framework that enables the active participation of the local community in decision-making processes pertaining to site management and conservation. The primary goal of the plan is to build clear and effective lines of communication between conservation authorities and the local community. This is intended to address any misunderstandings and foster collaborative efforts. Furthermore, it is imperative to establish outreach programmes aimed at enhancing the comprehension of the site among community groups. This involves collaborating with community organisations to coordinate events and initiatives aimed

at increasing awareness, such as delivering presentations, lectures, and conducting tours (Mas *et al.*, 2022). Ultimately, effective management of the Niah Caves prehistoric sites necessitates collaboration among various stakeholders, encompassing local populations, academic scholars, and government organisations. According to Abdullah and Hamid (2018), safeguarding the significance of the site for future generations and maintaining its valuable scientific and cultural knowledge can be achieved by the implementation of a comprehensive management programme encompassing research, conservation, visitor management, and outreach efforts.

Furthermore, the management approach of the Niah Caves archaeological site focuses a considerable emphasis on the preservation of its cultural and natural resources. The preservation concept is realised through the establishment of a collaborative framework that aims to facilitate efforts in site preservation. This framework involves the active participation of professionals from various disciplines, including archaeology, anthropology, architecture, and local history. The objective of this policy is to present a comprehensive set of guidelines for conducting excavations in a manner that optimises the exploration of hidden historical artefacts while simultaneously ensuring the preservation of the structural stability of the excavation site. In order to sustain the integrity of historical knowledge, it is crucial to prioritise the protection of fragile artefacts and their corresponding contextual data throughout excavation efforts. The implementation of protective barriers or enclosures surrounding caverns serves to mitigate anthropogenic site degradation and guarantee exclusive access to authorised personnel. In addition, it is imperative to develop strategies for effectively maintaining artefacts to safeguard them from potential loss or damage during the processes of excavation and handling (Alim, 2023).

A resilient legal framework is necessary to clearly define the necessary conditions for

partnership and resource-sharing between conservation agencies and the local people. Ensuring alignment between policy and ethical standards that highlight cultural sensitivity and display respect for the traditions and beliefs of the community is of utmost importance. The legal framework encompasses protocols pertaining to excavation activities that prioritise the preservation of archaeological sites, while also promoting the identification and research of hidden historical components. To effectively address the potential negative consequences of excavation, it is crucial to implement a range of measures designed to reduce and mitigate unintended harm. The approaches encompass the extraction of silt particles and the alteration of adjacent areas. Facilitate the establishment of a collaborative and mutually beneficial partnership between archaeologists and conservation specialists in order to effectively align the archaeological investigation process with preservation goals (Mwitondi *et al.*, 2021).

For the short-term and long-term preservation of an archaeological site's cultural significance, its management policy is vital. In establishing a well-defined strategy for funding and resource allocation, disaster preparedness, safety response, community participation, education, and visitor management, the policy must handle numerous constraints, difficulties, and possibilities. The preservation and preservation of the site for future generations can be secured by establishing a thorough management policy based on a scientific and empirical approach. This technique involves conducting scientific studies, archaeological research, and using empirical evidence to influence decision-making. The management policy is better suited to address challenges and make sensible decisions regarding preservation measures because it relies on true facts. Adopting such a policy is intended to ensure the preservation of the place for future generations. This signifies that the site's cultural, historical, and archaeological significance will be preserved and conserved over time. The integrity and cultural significance of the site can be preserved in a manner that allows future generations

to enjoy and learn from it by applying proper management measures.

Choosing Management Strategies

For the preservation of the prehistoric site of the Niah Caves, a well-defined and effective management plan is required. Important for the site's effective conservation and long-term use is the selection of appropriate management strategies. The cultural significance and historical significance of the property are significant factors in choosing the most efficient management approaches. Determining the cultural significance and heritage value of a location helps as a foundation for creating preservation and protection strategies. Numerous factors, such as its historical, cultural, and scientific significance, can be used to evaluate the importance of an archaeological site.

Management strategies for the Niah Caves also consider its preservation and conservation over the long future. Installing protective barriers or fences to prevent unauthorised entry, for example, is an essential precaution for preventing accidental site damage and discouraging potential vandals and thieves. In the meanwhile, access restrictions minimise the influence of human activities on the site, which can be damaging to delicate archaeological artefacts. Theft and vandalism, which can have severe impacts on the preservation of archaeological artefacts, can be prevented via access control systems. In addition to limiting site access, guidelines for artefact management help preserve the archaeological record and ensure that no artefacts are damaged or lost during excavations (Bushozi, 2022).

To manage visitor management, guidelines for visitor conduct must be established and successfully communicated to all guests. This could include restrictions on touching or removing artefacts and designated tourist activity areas. In addition, management must be committed to properly enforcing these rules with the necessary personnel and resources. Integral to the Niah Caves' management approach is ensuring that tourists will be able to enjoy the

site while conserving its cultural significance for future generations. By touching or removing artefacts, stepping on fragile surfaces, or disrupting delicate sediment layers, visitors may unwittingly cause damage to the cave system (Mohale *et al.*, 2020).

An effective management strategy for the Niah Caves archaeological site should encompass not only the preservation of the site and the administration of visitors, but also incorporate initiatives related to public relations and educational efforts. Brochures or leaflets containing information regarding the significance and historical background of the site can be acquired by visitors both on-site and in nearby tourist centres and hotels. The aforementioned documents potentially encompass data pertaining to the cultural and archaeological significance of the site, as well as its historical background and ongoing research endeavours aimed at enhancing comprehension of its significance.

In addition, outreach programs should be developed to increase community groups, understanding of the site. This may include working with local community groups to organise awareness-raising events and activities such as presentations, lectures and tours (Mas *et al.*, 2022). In the end, all stakeholders, including local residents, academic scholars, and government agencies, must collaborate on the management of Niah Caves prehistoric sites. By implementing a full management programme that includes research, conservation, visitor management and outreach, the site's importance for future generations can be protected while preserving the essential scientific and cultural knowledge it offers (Donna Lee Abdullah & Abdul Hamid, 2018).

Meanwhile, permissions or other types of regulation to guarantee that site users adhere to the policies and procedures of the site. In addition, establishing policies for the treatment of on-site artefacts encompasses preservation, storage, and display procedures. These regulations ensure that antiquities are suitably conserved and safeguarded, and that their worth

is not decreased by mistreatment or neglect (Luz Endere *et al.*, 2021).

Additionally, educational and outreach activities could be created to increase awareness of the significance and value of the site's heritage. This includes generating instructional materials such as pamphlets and leaflets and engaging with local schools and community groups to promote the site's significance. Consideration must also be given to the participation and support of the local community in the implementation of the management policy. Local community involvement is essential for long-term sustainability because it fosters local ownership and control. Participation of the local community in the development and execution of management policies is essential for several reasons. First, the community has a deeper grasp of the cultural heritage, history, and significance of the location. This information is essential for designing management strategies that will conserve and maintain the site most efficiently. Second, involving the local community fosters the required sense of ownership and responsibility for the property's upkeep. Vandalism and theft are deterred more effectively by including the local populace in site management (Umar *et al.*, 2022).

There are a variety of strategies that can be utilised to incorporate community participation into the Niah Caves prehistoric site's management regulations. The first strategy is to establish public-private partnerships that capitalise on the resources and expertise of local firms. These agreements could provide fund for the implementation of protection and conservation measures. The second strategy is involving local schools and community organisations in the development of teaching materials and outreach initiatives. These instructional materials may consist of pamphlets that provide information about the significance and history of the location. Outreach programmes could also include community events such as exhibitions that emphasise the significance of the place and its worth as cultural heritage. Working with local companies to promote sustainable

tourism is the third approach. Involving local companies in management strategies ensures that tourism is conducted in a manner that is both sustainable and has a minimal impact on the local environment.

Developing effective management techniques for Niah Caves prehistoric site requires careful consideration of several elements including its location, geography, geology, and other natural elements that may affect its preservation and conservation. For example, Niah Caves are in a tropical rainforest, which may increase the risk of moisture-related degradation and possible impacts on climate change. Potential site hazards, such as natural disasters, vandalism, looting and unsustainable tourism, should also be considered. Effective management plans need to be developed to proactively address these concerns and limit their impact on the heritage value of the site.

In addition, when choosing the right management solutions, the resources available for implementation and enforcement of the policy must also be considered. Financial resources, human resources, and technical competence are critical factors in the feasibility and effectiveness of management techniques. Education and outreach, for example, require funding and the involvement of local experts and educators in their development and implementation. Involving the local community in the development and implementation of management strategies is critical to long-term success. The preservation of the cultural and historical value of the site is the result of the local community's support and participation in management policies that promote a sense of ownership and responsibility.

Ensure that the chosen management strategies for the Niah Caves prehistoric site are accomplishing their intended goals by frequently evaluating their efficacy. Reviewing strategies frequently enables the identification of improvement opportunities, the refinement of existing policies, and the development of new strategies to address emerging dangers or opportunities. Monitoring visitor behaviour,

documenting changes in the physical environment of the site, and measuring the impact of educational and outreach activities are all ways to evaluate the efficacy of management actions. The participation of stakeholders, such as local communities, appropriate government agencies, and other interested parties, should be required for periodic reviews. Reviews must include comments from tourists, locals, and other pertinent parties.

Identifying the specific objectives to be accomplished with management approaches is essential to determining their efficacy. For instance, one objective can be to increase the number of site visitors who engage in instructional activities during their visit. Once the goals and objectives have been established, data may be collected to see whether the approaches are achieving them. Adjustments should be made as necessary based on the evaluation. If an approach fails to achieve its intended objectives, it may need to be adjusted or abandoned. In contrast, if a particular initiative proves to be especially profitable, it can be replicated or expanded to other regions (Pereira & Martins, 2018).

In conclusion, when selecting management solutions for the prehistoric site of the Niah Caves, it is vital to use a thorough and comprehensive strategy that takes numerous elements into account. The importance of the site's cultural value must be addressed primarily. Understanding the historical and archaeological importance of Niah Caves is crucial for making informed management decisions. This requires recognising its significance in local, regional, and even global contexts. Moreover, involving the local communities, particularly indigenous groups and nearby residents, fosters a sense of ownership, stewardship, and pride in the preservation of their past. Their traditional knowledge and perspectives greatly contribute to management strategies and ensure the sustainability of preservation efforts. Climate, geology, vegetation, and natural processes, among others, can have an impact on the preservation of a site's physical environment.

Understanding these environmental dynamics is crucial for devising methods to avoid potential threats and minimise harmful impacts on archaeological artefacts.

The adoption of alternative management practises is also influenced by other factors, including the availability of financial and human resources. It is vital to have appropriate resources and workers who have received adequate training to supervise the activities of visitors, carry out research, maintain infrastructure, and execute efficient conservation measures. It is crucial to locate and acquire the required resources to ensure the site's continued preservation over the long term. To ensure that the cultural history of the Niah Caves site is protected and that it will be preserved for future generations, it is essential to design appropriate mechanisms and frequently examine the effectiveness of those activities. Because of this, both preventive and reactive measures are required. It is feasible to use protective barriers to shield archaeological features that are susceptible to damage from being damaged. Restricting access to some areas can help reduce the negative effects that visitors have on a location by lowering the risk of vandalism and accidental damage. It is necessary to formulate artefact management policies to forestall the unlawful removal of cultural artefacts and prevent their theft.

Monitoring and Reviewing the Plan

To ensuring the site's preservation and protection, monitoring, and evaluation of the plan are necessary. Regular data collection and analysis, evaluation of the effectiveness of management strategies, and identification of new risks and difficulties can serve as the foundation for adjustments to the management plan and ensure the preservation of the cultural heritage of the site for future generations. These activities can be performed in conjunction with one another. The monitoring and evaluation of management must have procedures that allow for ongoing feedback from stakeholders. In the process of management, each group contributes its own unique viewpoint as well as the

problems that it faces. People may, for example, be concerned about the effect that tourism will have on the cultural and ecological integrity of a site, while local business owners may be interested in fostering economically beneficial sustainable tourism. Visitors may be concerned about the site's accessibility and safety, while government officials may be concerned with ensuring that the site is operated in line with applicable rules and regulations. Both groups may be concerned about the site's operation. For the effective participation of stakeholders, continuous communication and coordination among all parties involved is necessary. This could involve conducting frequent meetings or workshops to discuss issues and concerns, exchanging information regarding the quality of the site and the number of visitors, and asking advice on the effectiveness of the management mechanisms that are currently in place. When it comes to decision-making in management, consideration should be given to feedback from stakeholders (Demas, 2000).

Effective engagement of stakeholders needs continual communication and collaboration among all parties. This may involve conducting frequent meetings or workshops to discuss issues and concerns, sharing information about the site's state and the number of visitors, and asking feedback on the efficacy of current management procedures. Stakeholders should be encouraged to contribute input and suggestions for enhancing the management plan, and their views should be considered when making management choices. Participation of stakeholders in the monitoring and amendment of the management plan on a regular basis can bring several benefits. First, it can assist uncover issues or concerns that are emerging and may deserve more examination. Second, it can provide valuable feedback on the efficacy of existing management practises and enable managers to make the required adjustments to ensure the site is managed as effectively and sustainably as feasible. Thirdly, it can inspire stakeholders to take an active role in the long-term preservation and conservation of the site by fostering a sense of ownership and responsibility among them (Endere *et al.*, 2021).

Flexibility and adaptability are crucial components of a successful monitoring and assessment procedure for the management plan of Niah Cave. Numerous factors, such as environmental changes, new scientific discoveries, changes in tourist behaviour, and evolving threats to the site's cultural significance, may cause the site's circumstances to evolve over time. It is essential to create a system that can rapidly recognise and react to these changes. The monitoring and review procedure must be designed to discover new issues or concerns and to modify management strategies accordingly. For instance, if visitor conduct is detrimental to the site, the management plan should be amended to incorporate new limits or guidelines. If new threats to the site's cultural significance are detected, such as unlawful excavation or looting, the management plan should be revised to account for these dangers. Integrate periodic evaluations and updates of the management plan within the process.

The evaluation process includes the participation of local people, government organisations, and experts in sectors like as archaeology, conservation, and tourism management. Assuring that management strategies are reflective of the most recent information and best practises requires ensuring that the most recent scientific information on the site is incorporated into the review process. It is necessary to provide reports on a regular basis to maintain the website administration's accountability and transparency. The reporting should include up-to-date information on the status of the site, visitor numbers and behaviour, as well as the effectiveness of the management approaches already in place. Reports may also include the identification of emerging threats and concerns, as well as the countermeasures that were utilised.

To summarise, the management of Niah Cave calls for a monitoring and evaluation process that is malleable, flexible, and quick to react. To preserve openness and accountability, the process should contain recurring activities such as data collection and analysis, contact

with stakeholders, review and amendment of management plans, and report generation. The cultural and historical significance of the location will be preserved for future generations if a mechanism of stringent monitoring and verification is implemented.

Conclusions

The maintenance and administration of the Niah Caves are crucial for preserving its cultural relevance and heritage value. To achieve this objective, it is necessary to establish a comprehensive management strategy that includes several critical components. Within the management plan, emphasis should be placed on conservation actions initially. This includes employing the appropriate approaches and precautions to conserve the archaeological features, such as documentation, stability, restoration, and preventative conservation techniques. In addition, routine site monitoring is included to detect any degradation or potential hazards visitor management should also be incorporated into the management strategy. Establishing visiting guidelines, controlling tourist traffic, and implementing infrastructure that minimises physical effect on the archaeological remains are necessary measures for achieving a balance between accessibility and preservation of the site. By providing a rewarding and conscientious experience for visitors, the property can be appreciated while guaranteeing its long-term preservation.

Public outreach and education play a crucial part in creating respect for the Niah Caves' cultural significance. The management plan should describe measures to involve the public via interpretive programmes, educational materials, guided tours, and partnerships with local schools and communities. By fostering appreciation and regard for the site, it becomes a shared obligation and a source of pride for the surrounding community and beyond. Participation of stakeholders is essential to the administration of the Niah Caves. Participation of key stakeholders, including government authorities, local communities,

indigenous groups, archaeologists, and tourism agencies, ensures a collaborative approach to decision-making, resource allocation, and site management. The incorporation of their knowledge, viewpoints, and concerns generates a sense of ownership and facilitates the implementation of sustainable management methods.

Essential components of the management strategy are monitoring and verification. Regular assessment and evaluation of the deployed techniques permits the identification of their efficacy and prospective improvement opportunities. This may include scientific study, data collection, and analysis to determine the effect of management techniques on the conservation and heritage values of the site. When adopting management strategies, the significance of the site must be considered, taking into account its cultural, historical, and scientific value. The physical environment surrounding the cave should also be considered, including aspects such as climate, geology, and biodiversity. The mitigation of potential dangers such as natural disasters, human activity, and climate change is required. In addition, the availability of both financial and human resources should be taken into account when building the management plan. Effective management techniques require adequate funds, qualified employees, and coordination with key institutions and organisations to be implemented and maintained.

In conclusion, the Niah Caves and other prehistoric archaeological sites can be preserved and safeguarded with the execution of a thorough management plan and ongoing monitoring and assessment. By evaluating the significance of the site, engaging stakeholders, managing visitors appropriately, and promoting public education, these places can continue to offer invaluable insights into our shared past. In addition, the appropriate management of these sites ensures that future generations will be able to enjoy, learn from, and cherish them as an intrinsic component of our cultural legacy. From this it can be concluded that for a successful,

comprehensive and effective conservation and management policy of an archaeological site, all relevant stakeholders need to be involved. It is also the task of the Planning Coordinator, who in this case is the Sarawak Museum Department's Niah Cave Controller, to work with all relevant stakeholders to develop a plan that will significantly improve the current condition of the site. In addition, the site could be developed into a training centre for young scientists and a training ground for excavation and conservation techniques, with the expectation that new employment opportunities will arise through the various activities that will result from the effective management of the site.

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Conflict of Interest Statement

The authors declare that they have no conflict of interest.

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