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Research Article

Re-imagining Aerial Digital Archaeology in Cambodia: An Implication from Actor-Network Theory

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ABSTRACT

In this article, the complex relationship between archaeology and colonialism in Cambodia is examined, focussing on Angkor Wat. It will examine knowledge production, power dynamics in archaeology, and local narrative marginalisation in interpretation. It claims that traditional views of archaeology as preserving history are unidirectional and ignore sociopolitical and ethical issues. Modern archaeology uses archaeometry for precise analyses. Western nations often dominate knowledge production in this field, reinforcing their colonial legacies and unequal power structures. This power dynamic is examined through actor-network theory, focussing on technology, institutions, and local actors. The article will focus on aerial digital technology. In Actor-Network Theory, all entities, human and non-human (technology, institutions), are "actants". Foreign scholars and institutions dominated Cambodian academia, excluding local perspectives. Because revolutionary technologies like lidar are often controlled by foreign institutions, power imbalances persist, the article recommends a detailed paragraph or Cambodian-led and co-led lidar initiatives. Empowering Cambodian scholars and communities would balance the network. Cambodian-led research and collaboration with foreign scholars are needed. Co-creating projects, incorporating local knowledge, and data transparency are Actor-Network Theory recommendations. Cambodians should critically evaluate Lidar technology and collect and interpret data. Participation promotes local ownership, ethics, and accurate history. A more equitable Angkorian archaeology network is essential. Actor-Network Theory and collaboration can help us understand Angkor's past, empower Cambodians, and create a more inclusive narrative.

Keywords: Actor-network Theory; Colonial of Science; Aerial Digital Archaeology; Archaeology; Local Engagement.

INTRODUCTION

People often misunderstand archaeology as a social science subject that focuses on preserving historical events. Archaeology is frequently viewed as a tool for restoring artefacts, but it has a broader implication for society and related fields such as environment, law, medicine, and so on. Reflecting archaeology has also been greatly integrated with natural sciences and social sciences. Archaeology also includes archaeometry, which involves natural sciences such as physics, chemistry, mathematics, and technology, among others. These interdisciplinary technological advancements and integrated approaches could unearth and analyze data in a precise and efficient way. For example, tools like Lidar and radiocarbon dating have transformed our understanding of ancient landscapes and timelines. While this is true, archaeology has also been criticized, particularly for its role in colonialism or as a means of colonization. There have been numerous instances during the colonial period in which local artefacts were relocated and moved to the colonialized country as a means of demonstrating superiority. For example, many Khmer artefacts have been relocated to France. Historically, archaeology served as a tool to spread colonial dominance. In the contemporary period, archaeology contributed

to scientific colonialism and knowledge of production due to the power dynamic that Western nations have in network production and influences on materials such as technology, research, and skill, as explained by actor network theory (ANT). ANT will be used as a theoretical framework to investigate network function, specifically the connection between humans and non-humans that generates power dynamics. Uncovering the power dynamic in the network and how each plays a role will help to highlight disparities in Cambodian archaeology, particularly in areas like technology access and local participation. The article will discuss Cambodian history, archaeology, and the role of colonialism in archaeology. The article argues that enforcing a proper code of conduct in the local area could help to reduce scientific colonialism, particularly in aerial archaeology. It is important to note that ANT can explain how different actors contributed to the network, ranging from humans to policies, education, experience, and technology, interacting with the system and offering outcomes of knowledge production and cultural interpretation. Particularly, the lidar code of conduct, which has been mentioned in detail, would help ensure equitable collaboration by prioritizing data transparency, local involvement, and fair attribution of contributions; however, without it, an alternative outcome would occur. The article will be divided into sections, as follows: A review of the literature on colonialism in Cambodia, an account of the colonialism of archaeology and the ethic of archaeology in general, an account of the colonialism of archaeology and the ethic of archaeology in Cambodia, and the potential prospects for colonialism in Cambodia.

LITERATURE REVIEW

The Khmer culture, tradition, and civilization have received a lot of attention, admiration, and discussion on a regional, national, and international scale. Despite this, there remains a significant gap in local research and representation, owing primarily to structural barriers and historical marginalization (Karbaum, 2015). For instance, UNESCO has designated magnificent temples as World Heritage Sites, including Angkor Wat, Sombo Prei Kuk, and, most recently, Koh Ker as World Heritage Sites, but much of the research and interpretation surrounding these sites has been conducted by foreign scholars. It is important to note that several issues have been associated with the dominance of foreign scholars as the local is hindered by the lack of resources, training, and institutional support which has limited Cambodian scholars' ability to contribute to global discourses on their heritage (P. Heng, Phon, & S. Heng, 2020).

One of the challenges is the misinterpretation of historical facts and cultural norms when local voices are excluded. This not only risks distorting the narrative but also has long-term implications for cultural identity, particularly among Khmer youth, who may rely on hearsay or emotional interpretations rather than scientific evidence (Piphal, Sonetra, & Sotheavin, 2023). The absence of robust local participation has perpetuated a reliance on foreign expertise, which, while valuable, often prioritizes external agendas over local interests. Through ANT's lens, Piphal, Sonetra, and Sotheavin's "Invisible Cambodians" (2023) article could provide a better narrative of how colonial structures and foreign dominance in technology perpetuate power inequities, as well as explain the mechanisms that marginalize local scholars while highlighting opportunities for equitable participation. This article aims to promote local capacity, interpretation, and narrative while also reducing parachute research.

In terms of colonialism in Cambodian archaeology, there have been some literary works, but limited particularly by a Cambodian author, that has challenged the established order. There could be a variety of reasons for this, but one of the most important is the deeply ingrained colonial system and knowledge production in Cambodia that the former colonizer left behind. Although the article about the colonialization of archaeology in Cambodia still remains limited, a few recent publications have revealed this possibility. Heng Piphal's article, "De-exoticizing Cambodia's Archaeology through Community Engagement," explores how the public's disinterest in archaeology in Cambodia stems from the perception of colonial archaeology as exotic and exclusive to only the elite and foreigners (P. Heng, Phon, & S. Heng, 2020). In other words, the general public is unaware of the field's archaeological and conservation efforts. The author also asserted that the field's foreign dominance stems from its internationalized nature and the influx of foreign experts, primarily due to French colonization of Cambodia and the involvement of international organizations like UNESCO. These factors fostered a societal perception of Cambodia as an outsider and superior to the locals. However, the lack of local participation and representation may contribute to deprioritizing archaeology work for the locals. The literature has emphasized the significance of involving stakeholders in archaeological study and research, and this article concurs with the author's suggestion to broaden the scope of archaeology to incorporate more local, Cambodian perspectives. This approach aims to foster local ownership and knowledge sharing, as the study ultimately revolves around Cambodians and their culture. Therefore, we should not overlook or disregard them. A key focus of this article is the role of technology in perpetuating these inequities. While advancements like Lidar have transformed archaeological research, they often remain under the control of foreign institutions, limiting local access and reinforcing scientific colonialism

(Evans et al., 2013). Actor-network theory provides a framework to examine these dynamics, revealing how technologies and institutions interact to shape knowledge production.

In a separate article titled "Invisible Cambodians" H. Piphal, S. Sonetra, and N. Sotheavin (2023) have highlighted the role of knowledge production in the history of Angkorean archaeology, underscoring the disparity between foreign-dominated archaeological practices in Cambodia. Unlike the previous article, this one broadens the scope to encompass the entire process of knowledge production, underscoring the significant influence and dominance of foreign scholars and experts, while also acknowledging the absence of local participation. The article concentrates on the historical background of Cambodia, particularly the prominence of French scholars and experts, who often prioritize their agenda over Cambodian interests and agendas. Additionally, the colonial institutions like the École française d'Extrême-Orient (EFEO) significantly impact the colonization of knowledge production, exerting intellectual dominance in the Cambodian archaeological field. This, in turn, led to the creation of the article also underscores the structural disadvantages faced by local scholars and researchers, shedding light on the broader issue of archaeology's lack of recognition and visibility, a problem exacerbated by language barriers, inadequate funding, and limited resources. With that said, this article agrees with the three authors that knowledge production is controlled by the West, particularly the former colonizer in Cambodia's case, and that local research has been marginalized due to a lack of funding and technology and has not been well represented in the international forum, depriving local knowledge. However, the article sought to broaden this narrative to specifically address the issue of technology, and the foreign expert capitalized; that these technologies in archaeometry are not accessible to anyone, and local expertise is unquestionable. Technology can easily fuel parachute research, resulting in violations of research ethics and further strengthening the documented account of the Western narrative in archaeology. Such knowledge gaps and arguments will be addressed further below.

Specifically concerning aerial digital archeology, in the article titled "Uncovering Archaeological Landscapes at Angkor Using Lidar," (D. Evans et al., 2013) the authors elaborate on lidar technology's findings. In particular, the discovery of a city block, an advanced reservoir, and a civilization of refined sophistication at Angkor. Additionally, the authors specified that the outcome was comprehensive with Lidar, emphasizing the significance of the technology's clear geographical landscaping. The article Temple occupation and the tempo of collapse at Angkor Wat, Cambodia (Carter et al., 2019) focuses on the Khmer city center's relocation from Angkor. The article provides an overview of the aerial surveillance in Cambodia for the archaeological project, revealing that the National Aeronautics and Space Administration Shuttle Radar Topography Mission (NASA-SRTM) and the Japanese International Cooperation Agency (JICA) are involved. This broadens the scope of Lidar. The article also mentioned that lidar data was available in 2010, and it was subsequently investigated further by an aerial surveillance project in 2013. This demonstrated that lidar technology in Cambodia has significantly developed over the past decade, although it is still in its nascent stages.

The article titled "Mahendraparvata: Determining an Early Angkorperiod Capital via Airborne Laser Scanning at Phnom Kulen" (Chevance, Evans, Hofer, Sakhoeun, & Chhean, 2020) also underscores the significance of Lidar in facilitating the penetration of the dense forest to research the Phnom Kulen hills. The authors of this article noted that another lidar survey was initiated in 2015, covering a total area of 975 km2. Additionally, in the article titled "Airborne laser scanning as a method for exploring long-term socio-ecological dynamics in Cambodia" (D. Evans, 2016). Dr. Damian Evans showcased the establishment of the Cambodian Archaeological Lidar Initiative (CALI), which introduced lidar laser scanning technology in Cambodia.

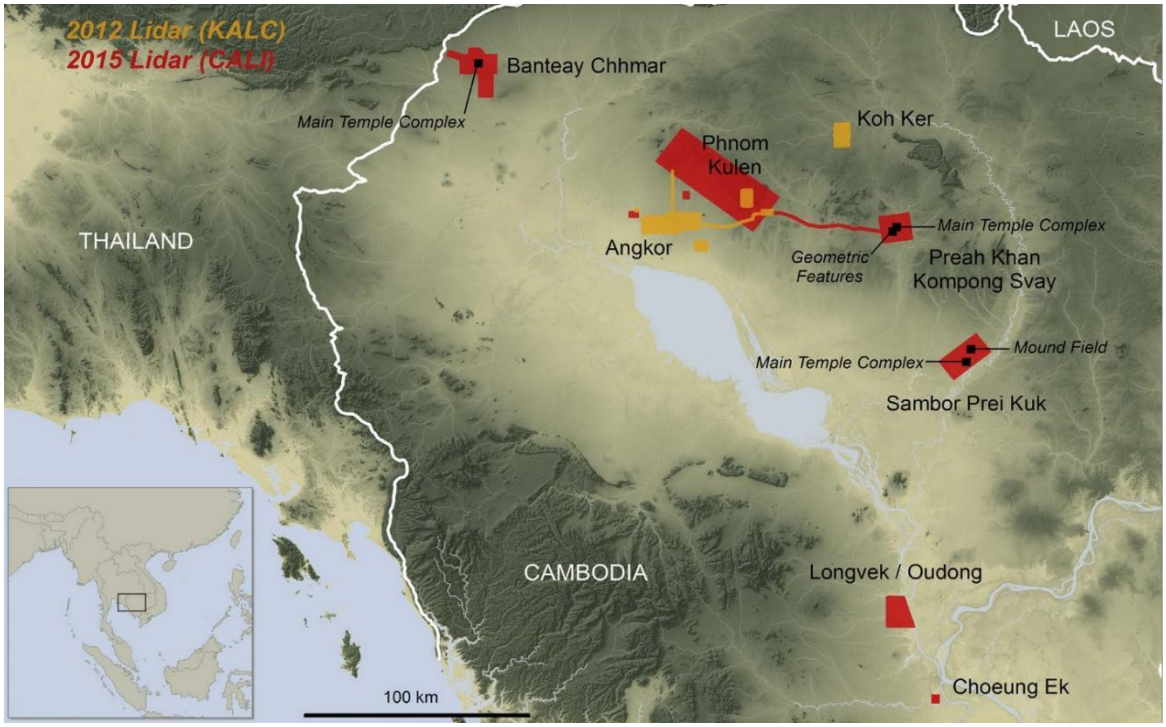

Figure 1. Map of Lidar Survey Increasing Significances of Surveying Locations in Cambodia, from 2012 to 2015 (Taken from "Airborne laser scanning as a method for exploring long-term socio-ecological dynamics in Cambodia," by D. Evans, 2016, Journal of Archaeological Science, 74, p. 167. https://doi.org/10.1016/j.jas.2016.05.009. Licensed under CC BY 4.0)

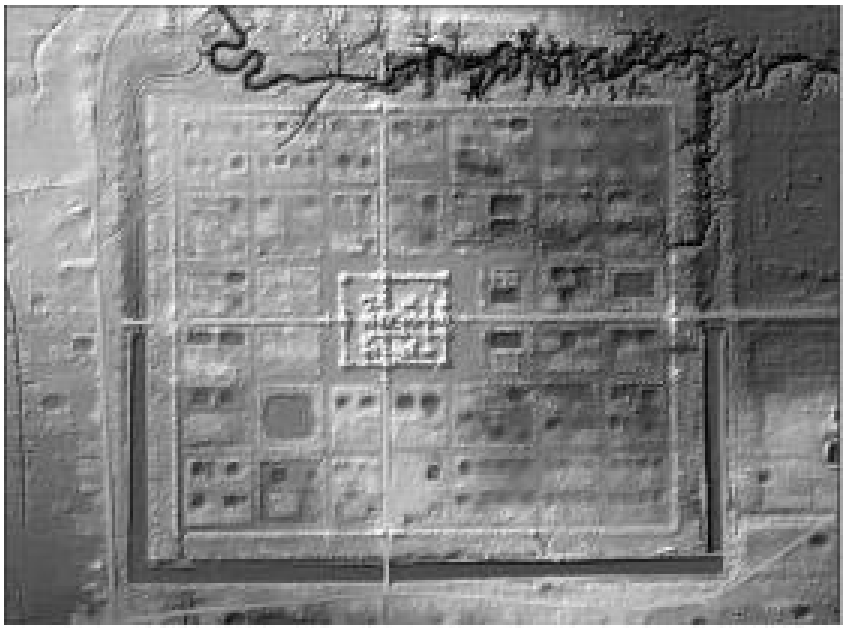

Figure 2. Lidar Scan of Beng Mealea Revealing Structural Details by Removing Vegetation (Taken from "Airborne laser scanning as a method for exploring long-term socio-ecological dynamics in Cambodia," by D. Evans, 2016, Journal of Archaeological Science, 74, p. 171. https://doi.org/10.1016/j.jas.2016.05.009. Licensed under CC BY 4.0)

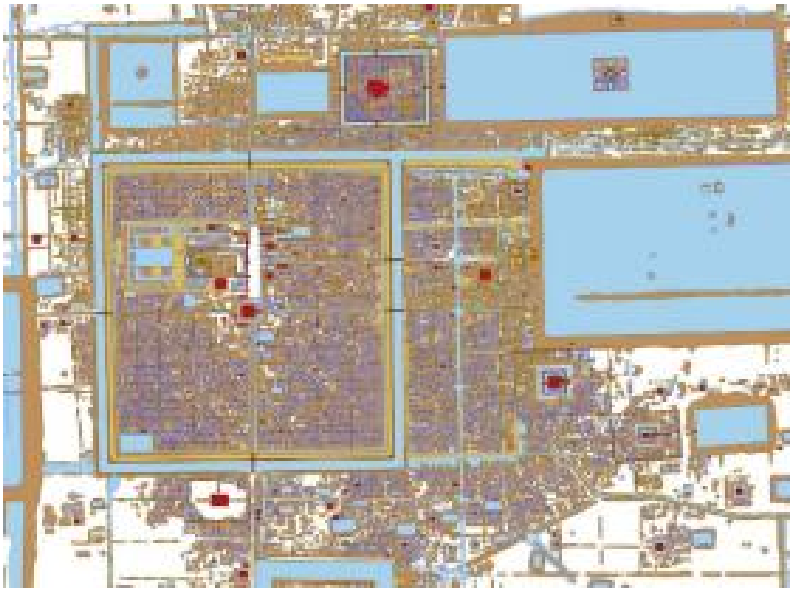

Figure 3. Map of Urban Structures Created after the Lidar Survey, Showing the Detailed Layout of Angkor (Taken from "Airborne laser scanning as a method for exploring long-term socio-ecological dynamics in Cambodia," by D. Evans, 2016, Journal of Archaeological Science, 74, p. 173. https://doi.org/10.1016/j.jas.2016.05.009. Licensed under CC BY 4.0)

Dr Damian uses lidar technology to map out and extract geographical surveys in days rather than months or years, while also providing specific data, as shown in Figure 2. In the meantime, lidar data could be colored and adapted to highlight detailed geography and landmarks, which is critical for understanding the social organization, as shown in Figure 3. With that being said, with such a powerful technology, Dr Damian Evans also remarked that a portion of the data concealed beneath the vegetation has been "unexpectedly" exposed by the survey. This raises the question of what the term "expectation" entails and whether an accumulation of excessive data from unanticipated sources threatens the nation, its citizens, and its community. In the article, Dr. Damian states that the Lidar program's total coverage spanned 1910 km2. In addition to Angkor, it extended to Bang Mealaea, Sambor Prei Kuk, Banteay Chhmar & Preah Khan Kompong Svay, Longvek, and Oudong, as shown in Figure 1. Notably, the quantity of land undergoing scanning is progressively expanding. This information may have educated the foreigners about Cambodia better than the Cambodians themselves. It is imperative to acknowledge that as a result of this revelation, who possesses the data? Even if the data have not been kept with due care, and if not, it could compromise a state secret or violate confidentiality. This has embedded the unseen potential for ethical concern, which is linked to the contribution to colonial science and will be further examined through the lens of actor-network theory below.

METHODOLOGY AND THEORETICAL FRAMEWORK

To uncover the potential colonial production of science and knowledge that is heavily dominated and influenced by the West, this article will conduct research with a focus on desk research. The article will examine gaps and potential exploitation using primary data, such as the Angkor Code of Conduct for Research. If the code of conduct is not robust, international research standards may unintentionally support colonial practices. Secondary sources, such as books, journals, articles, conference proceedings, and reports, will be used to investigate and gain a broader understanding of the context and findings. Both sources will influence the interpretation of data.

The article will employ actor-network theory, which seeks to examine the actors, both material and non-material, who form a network and can influence it based on the given situation, context, and timing (Müller, 2015). ANT is essential in science and technology studies as it reveals hidden or unseen phenomena that often go unnoticed in traditional analyses. The combination of actors and networks can produce results that reflect potential biases, inequalities, and power dynamics (Durepos & Mills, 2012). In this case, those with access to technology, skills, knowledge, and finances are likely to be influential in this network and thus influence the outcome. If not properly monitored, newer disciplines like archaeometry, more focused on natural science and technology, can both benefit archaeology and serve as a tool for scientists to uphold the colonial nature of science (Durepos & Mills, 2012; Odeny & Bosurgi, 2022). To provide an example, tools such as Lidar, isotope analysis,

and radiocarbon dating are mostly accessible only to foreign scholars. Furthermore, researchers trained in archaeometry methods may overshadow local expertise rooted in traditional practices, while foreign scholars with access to cutting-edge methodologies and global networks, as well as grants and publication in prestigious journals, may also overlook local contributions. This process emphasized inequalities in technology, skills, knowledge, and financial access. This dual potential highlights the importance of ethical oversight and equitable participation in archaeological research.

DISCUSSION

Defining Archaeology and its Relationship to Natural Science

To understand Cambodia's archaeological experience and colonialism, it is necessary to focus on archaeological practices and how they disrupt research ethics or links to parachute science, while also distancing local involvement and neglecting local knowledge. Cambodian archaeological interpretation has been heavily influenced by French scholars since the colonial period, when the processes of excavation, artefact discovery, and interpretation were influenced by French scholars and continue to be so today. Unfortunately, the imposition of foreign control and exploitation of Cambodia's cultural heritage continues to this day, with Cambodian artefacts remaining in foreign lands.

First, it is necessary to distinguish between history and archaeology. History as a subject serves as the foundation for the study of the past, which aims to uncover the past and human relations and interactions through written documents (Van Wijngaarden & Karali, 2020). Before delving into archaeology, it is important to distinguish between archaeology and anthropology. Anthropology is a branch of study that focuses on studying human relationships with the surrounding environment and equipment, as well as understanding social trends, beliefs, and ideas (Fahlander, 2004). Despite ongoing debates, archaeology is considered a field of study that employs artifacts from sites excavated or dug, emphasizing material remnants that undergo examination and transformation into historical information. It differs from history primarily in that it does not necessarily focus on fieldwork (Van Wijngaarden & Karali, 2020), whereas anthropology may use it in the form of a survey, interview, or observation to better understand human interaction with one another, beliefs, or the environment (Ananda & Nahallage, 2021). Various approaches, such as oral histories, surveys, and ethnographic observations, can aid in preserving colonial narratives in archaeology. These methods ensure that local voices are included and that interpretations are not solely based on Western perspectives. That being said, archaeology is not a stand-alone subject; rather, a multidisciplinary approach which should be emphasized (Shiffer, 1972). In other words, history or anthropology can supplement archaeology's findings and vice versa. Despite this, most people associate archaeology with the excavation of fossils or treasures to validate their existence. In reality, it is more complicated than that. As previously stated, archaeology digs or excavates with the goal of understanding people from the past, how society was, and how it has evolved. The idea expands beyond that, seeking to find the missing piece of a civilization's or humanity's history as a whole, using these artifacts as a massive clue. It is also important to note that archaeology is more than just adventuring in the jungle; it also includes complex tasks like lab analysis, writing, and reading (Stutz, 2022). The archaeologist also used sophisticated technology to help them with the excavation, including data collection, analysis, and interpretation (Britton & Richards, 2019). The two fields intersect significantly in Cambodia's colonial context, where anthropological insights can aid in understanding the cultural and societal impact of colonial archaeological endeavors. For example, colonial archaeologists frequently ignored the anthropological context, resulting in inaccurate interpretations of Cambodian history which will be discussed in section 6.

This article aims to comprehend the application of technology in archaeology, its impact on ethics, and its potential to impede scientific progress if not handled appropriately. With the so-called technological implication or usage in archeology, it is important to note that understanding the history of people in the past is usually perceived as boring because education tends to be about memorization of historical data, focusing extensively on wars and powerful leaders, and not connecting individual interests as the past historical account has been emerging for a long time (IPSOS, 2018). However, history, archaeology, and anthropology can yield far more intriguing discoveries. For instance, if an archaeologist finds pottery in a specific location, they may formulate hypotheses about the diet, influence, social trends, and implications. As a result, it is intriguing to learn about how people in the past thought and behaved. With all of the importance of archaeology explained, the field is gradually progressing, and in the 1950s, an archaeological sub-field emerged known as archaeometry or archaeological science. The advancement of technology and natural science research has had a significant positive impact on archaeology (Erb-Satullo, 2020). The significant effects include precise dating techniques, geophysical surveys, and biomolecular studies that enable deeper insights into artifacts. However, the over-reliance on technology sometimes marginalizes local interpretations, creating a mixed impact that can be both positive and negative

depending on its application. Natural science techniques can be used to scientifically intensify traces or explain a phenomenon or material used for the artifact discovered, as well as ground chemistry testing or other archaeological materials, and can provide additional explanations of the history and relationship of the surrounding environment (Smekalova et al., 2016). With this sophisticated technology and methods, archaeologists can use them or collaborate with related experts to unearth or discover a deeper meaning of history. To give a better perspective, the methods that can be used in archaeometry are as follows: There are eight groups of specializations:

"Chronological methods (relative and absolute methods). Dating by physical and chemical methods. Characterization & Provenance studies. Physical-chemical techniques and methods for the determination of the chemical content and attribution of the origin of raw materials with appropriate statistical elaboration.

Archaeo-geophysical prospection. Geophysical and remote sensing surveys for detection of ancient buried structures.

Archaeoastronomy. Study of the orientation of monuments related to celestial bodies and inference on ritual practices, religious festivities and determination of time,

Biomolecular archaeology. Ancient DNA and isotopic studies of bones and molecular remains in ancient pots and deduction of used nutritional content, generical relationships, and migrations.

Conservation Sciences, involve the physical chemical study of decay processes and the development of new methods of conservation.

Geoarchaeology – Environmental Archaeology. Environmental approaches provide information on past landscapes, palaeoclimates, flora, and fauna.

Cyber-archaeology. The coupling of archaeology, computer science, engineering, and the natural sciences, offers 21st-century solutions to safeguard the past for future generations and provides digital reconstructions in a virtual environment" (Liritzis et al., 2020).

Overall, these tools and natural science methodologies, such as math, physics, and chemistry, can be used for testing and sampling, as well as analytic techniques. Additionally, they serve as tools for data interpretation, including the creation of statistics, their integration with other archaeological data, and the storage and dissemination of data (Liritzis & Korka, 2019). The knowledge gained from these technologies and methods of material analysis helps to identify the type and nature of the remains. Working with machinery and proper techniques ensures precise data, making it easy to create a timeline or chronology that aligns with archaeological findings (Bialas, Glinkowska, Kepczynska-Walczak, Szrajber, & Urbaniak, 2003). Furthermore, the archaeologist will receive more contextual and subjective information based on scientifically provided evidence, which, when combined with technology and natural science, has the potential to spark new discoveries and fill research gaps. Despite the benefits, the technology is not without its drawbacks. For example, conducting the analysis necessitates the use of destructive sampling, which involves damaging the artifact to study and examine the chemical compounds. The destruction will permanently alter the state of the artifact, leading to a loss of information, and hindering future efforts by other scientists to verify the data (Pálsdóttir, Bläuer, Rannamäe, Boessenkool, & Hallsson, 2019). At the same time, archaeology may emphasize understanding the past through heavily on science, rather than the other way around, which may hinder other sociocultural contexts. Archaeologists should not only use scientific research, but also emphasize other methods/ disciplines like record research, map making, and data collection (Chemburkar, 2021). Therefore, it is important to highlight that as technology progresses and accessibility and convenience increase, archaeologists will use the technology more often. However, it is important to note the scientific ethics and the power dynamics in conjunction with technology, which should not be ignored.

An Overview of Western Privilege and Archaeology in the World

To begin with, believing that an archaeologist's archaeological discovery and historical narrative are final and complete is incorrect. Actor-Network Theory explains that each network is unique based on the relationship between actors. In this case, subjective factors such as archaeologist biases, available resources, and sociopolitical context can influence findings (Law, 2007; Horowitz, 2012).

Consider the actor-network theory argument, emphasizing that a finding's outcome is subjective and not objective, as it can vary based on mythologies, timelines, environments, and other factors (Law, 2007). The theory also acknowledges the possibility of a specific group dominating the network as a result of their access to and leverage on the network, whether through knowledge, resources, or technology (Horowitz, 2012). Before delving into Cambodia's archaeological situation, which goes beyond the literature mentioned above, the article will present case studies of unethical or potentially disturbing practices by outside experts who could exploit local

cultural objects if left unchecked and not properly monitored. The case studies include Heinrich Schliemann's excavation of Hisarlik and the unwrapping of Egyptian mummies during the British Egyptomania period. These cases demonstrate a disregard for scientific ethics and cultural respect, which is similar to challenges in some Cambodian archaeology, where foreign-led projects minimized local participation and ethical considerations.

To begin, it is important to note that the disturbed or unethical practice of archaeology is not a new phenomenon, and a system of exploitation—unethically removing or destroying local cultural objects—has existed for centuries (Chemburkar, 2021; Elia, 1997). This reflected dominance, colonialism, and ongoing exploitation that is currently invisible or disguised or overlooked, but as technology has advanced, the exploitation has grown and become more easily unseen. Heinrich Schliemann conducted the first case study in the 19th century, employing a vigorous and aggressive excavation method at a site called Hisarlik, modern-day Turkey, thanks to his abundant resources, support, and access to available research (Paksoy, 2023). The excavation was conducted unethically, not to mention that the named archeologist was only an amateur, and his unbridled enthusiasm and limited training were carried out in the absence of proper technology, only to be followed by his own beliefs and interests (Paksoy, 2023). It is important to note that archaeology must be carefully considered because, once the site has been excavated, it will be destroyed and cannot be reinstated or renewed for future use. As part of archaeology, geological methodology, specifically the layer of dirt or natural laying of the site, can provide information, particularly in terms of the chronological sequencing of human civilization and its activities over time (Gruškovnjak, 2020). Heinrich Schliemann carried out this type of excavation, and his hasty search for Troy City resulted in permanent damage to the site. It should also be noted that Heinrich Schliemann may have removed artifacts without proper documentation, and he may have interpreted and used these artifacts based on his own account and limited knowledge, without comparing them to the opinions of other experts as well as illicitly transferring them (Uslu, 2018).

In another case, in the same period of the nineteenth century, the infamous case of unrolling Egyptian mummies is described, along with a disturbing account of unethical archaeological practice motivated by Western archaeological practices (Day, 2014). Western scholars and society's obsession with a specific civilization, which is frequently viewed as a fantasy or created for the purpose of creating curiosity, frequently has a disturbing impact on host nations and the locals, as well as being disrespectful to the hosts. The obsession with unrolling the white sheet covering the mummies, or, in other words, Egyptomania, resulted in the mass transfer of mummies from Egypt to Britain in the nineteenth century (Moshenska, 2014). The British perceived the unrolling as a source of amusement, perhaps more than a mere object to gratify their cravings, while the Egyptians held it in high regard. The British distribute the sample during this process, and, akin to the previous instance, the unwrapping of the mummies unavoidably could have the unified bodies, as well as the hieroglyphics and the writing on the sheet (Baber, 2016; Moshenska, 2014; Robinson, 2014). This resulted in the loss of crucial clues and valuable information, which could have clarified the rituals, practices, and social activities of the Egyptians. The unwrapping or unearthing process of the Egyptian cultural remains and artifacts that lacked scientific value or methodology, revealed the hypocrisy of the West and the participation of its experts (Baber, 2016). Although the role of the Western archaeologist was not explicitly stated, it is unclear how the mummies could have been discovered in Egypt and transported to Britain, not without British archaeologists' involvement or dissemination of information to the general public. Almost certainly, the British archaeologist and peers act as middlemen in such mummy transporting. This is a disturbing account because the archaeologists are doing so without regard for ethics or scientific discovery, for the sake of certain emotional satisfaction (Moshenska, 2014).

Such a significant controversy undoubtedly sets and strengthens the tone of archaeological practices and ethics. However, the issue of pothunters and archaeologists unethically removing artifacts or conducting undocumented digging and excavation remains, if not eradicated, and continues to persist and circulate today, the 21st century. For example, there are allegations that a prominent German scientist collaborated with locals to smuggle artifacts from Nigeria to Germany while also remaining unreported and undocumented (Nomishan, Gubam, & Tubi, 2022). Given the information provided above, it is important to note that there are instances where archaeologists step out of line, out of ethics, and even become criminals in order to serve their own interests at the expense of permanently destructing, damaging, and destroying a specific national cultural object, pride, or identity. Given the foreign cases discussed here, it is crucial to thoroughly investigate Cambodia's situation and uncover any hidden archaeological practices.

FINDINGS

Western Privilege and Archaeology in Cambodia

It is important to emphasize that French colonization had a significant impact on archaeological practice,

narration, and interpretation in Cambodia. For instance, many regard Henri Mouhout in the 19th century as the "discoverer" of Angkor, implying in his writing that the locals abandoned the sacred monument, thereby demoralizing the locals. However, there is an earlier historical account in which a Portuguese claimed to have visited Angkor in the 16th century (Glancey, 2017). The French, intrigued by colonial interest and the history of Southeast Asia's past, founded an institute known as The École Française d'Extrême-Orient (EFEO), playing a role in the restoration of Angkor Wat since the early 1900s (Pottier, 2000). While the goal is to study the region's history, the perspective remains subject to French interpretation and narrative. In other words, the goal was to serve a colonial purpose reinforced colonial superiority while erasing local agency and contributions (Anderson, 2007). During the initial phase of the French account of the fall of Angkor, it's crucial to understand that the political struggle between the British and the French to explore a new civilization for cultural and colonial dominance resulted in the internment of the Khmer, with the intention of rehabilitating them. This narrative also depicts the Khmer's departure from Angkor and their subsequent abandonment of the French. Such a narrative has gained significant traction and influence in France, allowing De Laporte, for example, to gain financial interest from the government and lobby it to take control of Cambodia (Falser, 2013). Although De Laport alluded to Angkor, asserting and recounting its abandonment is a serious mistake, given the presence of Buddhist monasteries and monks close to the Angkor Wat temple at that time. However, De Laport deliberately manipulated the depiction to omit these details (Falser, 2013). This is an example of the French attempting to intentionally narrate an incorrect encounter while disregarding the locals. Due to the perception of locals as mere subjects under their authority, it is nearly inevitable that local stakeholders would not receive proper acknowledgement or even contribute to the research study's narrative and formulation. Furthermore, the forceful removal and transportation of Cambodian artifacts to France suggest that French scholars may be disregarding and disrespecting local culture and the people involved. It is important to note that local researcher and knowledge were not properly acknowledged in their research as well (Piphal, Sonetra, & Sotheavin, 2023). This resulted in scientific colonialism and parachute science, with the French maintaining that knowledge would be created. It is important to note that, as a result of colonialism, the EFFO has almost become a gatekeeper for research into Cambodian history. In other words, EFEO interpreted and disseminated Khmer history from a French perspective and they are the channel for distribution of knowledge. One aspect was the naming of the temple, where the French, in some cases, ignored the local name in favor of imposing their own interpretation and name. Along these lines, rejecting the authenticity of the Cambodian temple, the French, through EFEO, has transported a mass amount of Khmer cultural objects to France while also selling the Khmer artifacts to various buyers disregarding the importance of the cultural property to the locals (Anderson, 2007).

With regard to EFEO's influence on Cambodian archaeology, it is worth noting that in the experience of Angkor Wat conservation, there have been a few instances where a French architect has become an archaeologist, such as Henri Parmentier and Henri Marchal. Although archaeology should be considered a multidisciplinary approach, if not consulted with other experts, such as historians, archaeologists, or related experts, the narration of an account may be misleading and have an impact on the subject and the local community due to the unilateral perspective. For example, in his writing, Henri Marchal criticizes the Khmer construction technique that led to the temples' current state - collapsing (Marchal, 1932). In addition, Marchal's use of iron and concrete to restore collapsed temples and the removal of post-classic modifications disregarded the local historical context and cultural sensitivities, prioritizing accessibility for foreign tourists over authenticity (Chemburkar, 2021). It is worth noting that:

"... almost nothing would be known about the modifications made in the post-classic period, from the 13th century to the mid-16th, because Marchal and his successors were obliged to cover up or destroy nearly all the evidence in order to make the monuments more accessible, or to restore them to some approximation of their original state by removing later accretions" (Boisselier & Griswold, 1972).

This demonstrates that the restoration or exaction by the French, who claimed to be the conservator, was also destroying cultural property in addition to re-narrating the local association with the temple that undermined the agency of local scholars and communities. The claim is that the Khmer construction technique is problematic as it could be seen as flawed and biased, as the destruction of the temple could have been due to war, climate change, or a previous French explorer who forcibly removed the artifacts. Furthermore, in the 1950s, B. P. Groslier developed the narrative that Angkor is a hydraulic city, arguing for the water infrastructure that Angkor's leadership established to serve the purposes of water utilization and transportation. Though this account is partially correct, it is important to note that Groslier's hydraulic city argument downplays the importance of religion, culture, as well as local knowledge (Chemburkar, 2021). In particular, this model has been associated with much more than just the water management system; it must also be associated with religion, customs, and other factors.

Angkor also experienced looting and undocumented excavation from the French. André Malraux, then later

became France's minister of culture, is notorious for looting Cambodian artifacts and attempting to bring them to France; additionally, the hundreds of artifacts in the Museam Guimee have yet to be considered (Stepnowska, 2019). All these accounts have confirmed, based on actor-network knowledge, that France, with its access to financial resources, tools, and technology, has the power to dominate archaeological interpretation and narrative in Cambodia. With this account in mind, it is important to note that Cambodian history should be learned from the experience in order to actively maintain and conserve independence while decolonizing the former colonial narrative. In light of this, the progression of technology and the continuous fascination of global experts with the Khmer civilization will surely require the Khmer to participate equally, and it's crucial not to disregard the local knowledge and experience (P. Heng, Phon, & S. Heng, 2020). Further without adherence to this account will cause the local people and the world to become disconnected from the true account and history, affecting the rich history and the more than 2000-year-old civilization, which is one of the oldest in the world. These actions marginalized Cambodian voices, creating a knowledge imbalance that persists to this day, necessitating deliberate decolonization efforts.

Prospect for Cambodia's Areial Digital Archaeology

With tens of thousands of active archaeologists in the Western region, it is unquestionable that some of these experts will look to Asia or other regions to further their careers and projects, as some have done in Asia (Stark, 2008). As previously stated, Khmer should highlight the importance of the potential continuation of parachute science and scientific colonialism. In light of this, the ICC Angkor adopted the Angkor code of conduct for research on January 24th, 2017 (The Angkor Code of Conduct for Research, 2017). The significance lies in its commitment to responsible research at Angkor. Despite this, there are a few concerns that should be discussed, as technology, particularly aerial digital technology and analysis tools have advanced and human monitoring may no longer be able to detect unethical behavior. To begin with, the jurisdictional issue is important to emphasize in the code of conduct because it is primarily concerned with the region governed by APSARA (The Angkor Code of Conduct for Research, 2017). It is unclear how the code of conduct will apply outside of APSARA's jurisdiction. Furthermore, in Section 2.4, the following paragraph is included:

"The national cultural heritage comprises cultural property created or discovered on national territory" (Article 2) ..... Significant finds shall be promptly reported to the territorial authorities and to APSARA (the concerned department/s and the Angkor International Centre for Research and Documentation - AICRD) and appropriate protective measures shall be determined in conjunction with APSARA on a case-by-case basis ..... At the conclusion of the current research project, unless specific exemptions are given, all findings must be handed over to APSARA. As soon as practicable, arrangements should be made for the subsequent storage of finds, samples, and records in accessible public repositories (museums, archive collections, lapidaria etc.) (The Angkor Code of Conduct for Research, 2017)."

The paragraph above could be interpreted as follows: a list and catalog of all finds will be provided to APSARA on a regular basis. There are a few concerns, however, while all discoveries will be presented at the conclusion of the project, The term "all finds" is ambiguous; does it refer to raw data or cooked data? If it intends to refer only to the findings of the research study, is it an unexpected or out-of-scope discovery? This could result in different interpretations between the researcher and the authority. In terms of technical aspects, it is unclear whether ASPARA has a monitoring and evaluating mechanism in place to ensure that all findings are legitimate and not fabricated. For example, an ill-intentioned archaeologist could replace the original artifact with a replica or swap samples to deceive. In addition, it is important to note that an exemption may occur in this same section, and the fact that the research may not be required to share all findings is quite concerning; however, the suggested not-reported finding could serve as a potential finding or data for another link area of research. Furthermore, the timeline discussion is important because the code of conduct only became available in 2017 (The Angkor Code of Conduct for Research, 2017). Without the restorative nature, it can be argued that prior to 2017, data, findings, and proper collaboration by the local with the foreign scholar may not have been well protected, shared, and fairly credited.

The code of conduct also emphasizes the importance of crediting and acknowledging those who contribute to the research project, but this obligation is not reinforced by publication or sanction (The Angkor Code of Conduct for Research, 2017). It is also unclear regarding the publication because the relevant information will be specific to the MoU, raising the question of whether the MoU will be adequately reinforced, particularly since the nature is non-binding. Publication and dissemination of information are important because they are the stages at which the researcher shares the findings and finalized thoughts with the public and peers. Therefore, in addition to the concerns for all findings, the publication of results and analysis methods, as well as crediting, particularly to the local, should be given special attention. In such cases, it is recommended to include a mention of the penalties for not enforcing the Angkor Code of Conduct for Research.

The code of conduct addresses a broad range of research rights and responsibilities and does not distinguish between on-land archaeology, underwater archaeology, and aerial archaeology, all of which have distinct characteristics, such as excavations and surface studies, another focusing on exploring submerged sites, and the last utilizing technologies like LiDAR and drones to efficiently survey large areas. Certain special considerations, such as privacy, should be prioritized, particularly in the context of area surveillance. Figure 1, Figure 2, and Figure 3 above show the complexity and power of lidar, which inevitably becomes dual use and purpose that require proper governance. The code of conduct already stipulates the application of relevant national laws, but the foreign researcher's objective does not include studying all Cambodian laws, potentially wasting their time and resources. They may also proceed without taking into account or violating the privacy mandate, and privacy measures in Cambodia are not properly enforced. Extending the code of conduct reveals that, despite Cambodia's efforts to uphold a higher standard of research, there exist potential loopholes or ambiguous areas that foreign research, or research in general, could exploit. This is particularly concerning given their power dynamics and influence on technology through archaeometry, as previously mentioned. It is increasingly likely that archaeology will become a colonial science, influenced by Parachute culture, and knowledge production. As digital archaeology technology becomes more widely used, there are still many questions about how to conduct ethical research and establish a solid monitoring and evaluation process for archaeological archaeology in Cambodia. In any case, the purpose of this research article is to draw attention to the grave concerns about colonial science and the production of knowledge by a power that continues to dominate the local identity, culture, and tradition. To capitalize on this concern, it is crucial to properly consider research ethics and empower local researchers.

CONCLUSION

The examination of Angkorian archaeology through the lens of colonialism reveals a complex network of actors and their interrelations. This network, shaped by historical power dynamics, has resulted in a situation where foreign scholars hold a dominant position in knowledge production. Colonial practices marginalized Khmer scholars and communities, disregarding their knowledge systems and diminishing their role in understanding their cultural heritage. Actor-Network Theory offers a valuable framework for understanding this dynamic. Actor-Network Theory posits that all entities – human and non-human – can be considered "actants" within a network. These actants interact, collaborate, and sometimes conflict, shaping the overall outcome. In the Cambodian context, foreign scholars, universities, and institutions like EFEO have been key actants. They brought technology, funding, and expertise, allowing for significant advancements in Angkorian archaeology. However, this dominance has marginalized Cambodian scholars and communities, raising critical concerns about data ownership, ethical collaboration, and the unbiased integration of local knowledge. Their knowledge, often passed down through oral traditions or embedded in the landscape itself, has been disregarded or undervalued. Additionally, advanced technologies like Lidar, while offering incredible potential, raise concerns about data ownership and potential biases in interpretation. To move forward, a more balanced network is needed. Cambodian scholars and communities must be empowered to become active participants. This requires investment in Cambodian research institutions, training programs, and infrastructure. Collaboration with foreign scholars is still crucial, but the terms of engagement must change. Cambodian research questions and perspectives should be central. Actor-Network Theory emphasizes the importance of "enrollment," where actants are persuaded to join a network and contribute to their agency. In this case, enrollment strategies are needed to bring Cambodian scholars and communities into the network. This could include co-creation of research projects, integrating local knowledge with scientific methodologies, and ensuring data transparency and accessibility, as well as an emphasis on training programs, investment in research infrastructure, and collaboration mechanisms that priorities local research questions and methodologies. Furthermore, technology itself can be seen as an actant within the network. While Lidar offers valuable insights, it should not be seen as a neutral tool. The way data is collected, interpreted, and disseminated all have social and political implications. Cambodian researchers and communities should be involved in these processes to ensure their voices are heard and their cultural heritage is respected. Rebuilding the network of knowledge production in Cambodian archaeology is a complex but necessary endeavor. By applying Actor-Network Theory principles and fostering collaboration between diverse actors, a more inclusive and equitable approach can be achieved. This will not only empower Cambodian scholars but also lead to richer and more nuanced understandings of Angkor's past. Ultimately, the goal is to create a network where all actants – foreign and Cambodian, human and non-human – can contribute their unique perspectives to a shared story of Angkor.

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