



Claiming the hydraulic network of Angkor with Viṣṇu: A multidisciplinary approach including the analysis of archaeological remains, digital modelling and radiocarbon dating: With evidence for a 12th century renovation of the West Mebon



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ABSTRACT

Prior to the investigations in 2004–2005 of the West Mebon and subsequent analysis of archaeological material in 2015 it was presumed that the Mebon was built in the mid-11th century and consecrated only once. New data indicates a possible re-use of the water shrine and a refurbishment and re-consecration in the early 12th century, at which time a large sculpture of Viṣṇu was installed. Understanding the context of the West Mebon is vital to understanding the complex hydraulic network of Angkor, which plays a crucial role in the history of the Empire.

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1. Introduction

The relationship between cosmology, geography, hydraulics and sovereignty has been important to the development of Southeast Asian societies' religious practices and state formation. The hydraulic network of Angkor in Cambodia was developed by the Khmer rulers to take both symbolic and physical control of this water, and to reinforce their power. Sanctified water from the source on the Kulen Hills was fed into the channels of the hydraulic network of Angkor and into the large reservoirs (*baray*) and moats of the temples.

In addition to the profane work of supplying water and mitigating floods, the purpose of creating hydraulic works was to substantiate the king's ability to control water and to signify the magnitude of his authority. Further, it was important to consolidate his alliances with the gods by establishing his divine connection with the heavens. From the early history of Southeast Asia epigraphy indicates when a king evokes Śiva or Viṣṇu they also undertake some impressive hydraulic works. To that end, successive rulers in Angkor modified the water network over several hundred years, creating a complex network of hydraulic infrastructure.

The key to understanding the hydraulic network of Angkor and the proposed alterations of the early 12th century are the two phases evident in the archaeology of the West Mebon and the installation of an enormous bronze Viṣṇu at its centre. It is significant that the Vaiṣṇavite king Sūryavarman II (r. 113–1150+) later added Angkor Wat into the network, south of the West and East Baray, and approximately midway between them.

The West Mebon is unique in Khmer archaeology and its position within the hydraulic landscape of Angkor makes it a very significant monument. The Mebon is located in the middle of the vast Western Baray reservoir at Angkor. In the middle of this sanctuary is a large basin, creating a pond approximately 100 m². A causeway from the eastern gateway leads to a central platform in this basin. The platform, which contains two shafts, was excavated in the 1930s and 1940s by the École Française d'Extrême-Orient (EFEO).

In 1936 fragments of the exceptionally large bronze sculpture known as the West Mebon Viṣṇu, and other artefacts, were found in the western shaft, seen here upon their discovery by French archaeologists (Fig. 1). This massive bronze sculpture may be that mentioned in the late 13th century when a Chinese envoy to Angkor, Zhou Daguan recorded that there was a large reclining sculpture of Buddha located in the 'East' Baray. According to his report water issued from the sculpture's navel (Zhou Daguan, trans Harris, 2007: 48). In his journal, Zhou Daguan locates this sculpture in the Eastern Baray. No evidence has been found to indicate a large reclining Buddha in the Eastern or Western Baray, and it has generally been assumed that the Chinese visitor was identifying the West Mebon Viṣṇu.

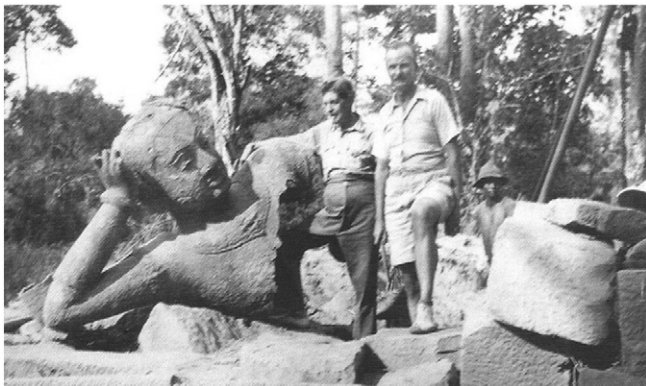


Fig. 1. The West Mebon Viṣṇu upon discovery in 1936 (left to right): Henri Marchal, Maurice Glaize and an unidentified Khmer man (EFEO).

Although the exact date of the construction of the West Mebon is not known, the bas-reliefs, on the temple gates are considered to be in the style of the Baphuon and therefore associated with king Udayādityavarman II (1050–1066 CE). However, re-excavation of the central platform in June 2005 indicated a diachronic succession and a more complex chronology.

The first installation on the central platform of the West Mebon was a column of some kind, possibly a *liṅga*. As the founder of the temple is generally thought to have been Udayādityavarman II, a fervent Śaivite, the *liṅga* may therefore date to the creation of the temple in the mid-11th century. The second installation within the Mebon was the Viṣṇu, which must be later than the mid-11th century. Stratigraphic evidence from within the Mebon's central basin indicates that the pond had been cleaned and restored in the early to middle 12th century, suggesting an alternative context in which the Viṣṇu may have been emplaced in the West Mebon.

Stylistic analysis of the large bronze sculpture of Viṣṇu also indicates it is a transitional work from the end of the Baphuon Period which heralds the style of Angkor Wat, and this indicates it was made long after the Mebon was built. Objects found in the shrine and its surrounds also point to a later date and a possible re-use of the shrine.

2. The West Mebon — background

Angkor is situated on a vast, low-relief plain that extends from the Tonle Sap (the Great Lake) to the Kulen Hills. Fig. 2, a comprehensive map of Angkor by Evans and Pottier, shows the expansive hydraulic and temple system of Greater Angkor which includes around 2000 known temples and shrines. Climate in the region is sharply seasonal, with intense summer monsoon rainfall between May and October, and a prolonged dry season for the remaining months. In these circumstances it is necessary to mitigate flooding in the wet season and secure access to water during the dry. Disruption to this seasonal pattern – an extreme wet or dry season, for example – can present difficult conditions for rural, agrarian communities. This is the context in which the complex hydraulic network of Angkor was established. The complex layout of the hydraulic system and position of the West Baray and its Mebon within this network can be seen in Fig. 3. These networks served both sacred and profane purposes: to store and disperse water for agriculture and other purposes during the dry season, to protect the urban population from flooding during the wet season; and were endowed with spiritual significance and divine attributes.

The West Mebon is a water shrine that is generally considered to have been built in the 11th century by Udayādityavarman II (Cœdès, 1968: 138; Jacques and Lafond, 2007: 141), although the substructure may have been built earlier. The structure is located on an island built with a series of stepped masonry in the West Baray. The West Baray is a massive artificial lake 8 km long and 2.2 km wide; the largest of the great reservoirs of Angkor, holding an estimated 52 million m³ of water at capacity. The West Mebon and its adjacent island are isolated in the centre of the *baray* seen in Fig. 4. In the wet season, when the *baray* is full, the island and shrine are surrounded by water and it is only possible to reach them by boat. Early 20th century French maps indicate large villages on the bed of the *baray*, the bed is crossed by roads and the former landscape is visible as seen in Fig. 5. Since the French renovation and modification of the canal network in the 1940s the West Baray permanently carries water and is generally full in the wet season.

2.1. Details of the structure

The outer wall that surrounds the Mebon has three gates on each side. The eastern gate is seen from inside the Mebon in Fig. 6. On the eastern side of the enclosure an earthen platform forms a landing area that could have been used to service the water shrine. In the middle of this sanctuary is a large basin, creating a pond approximately 100 m².

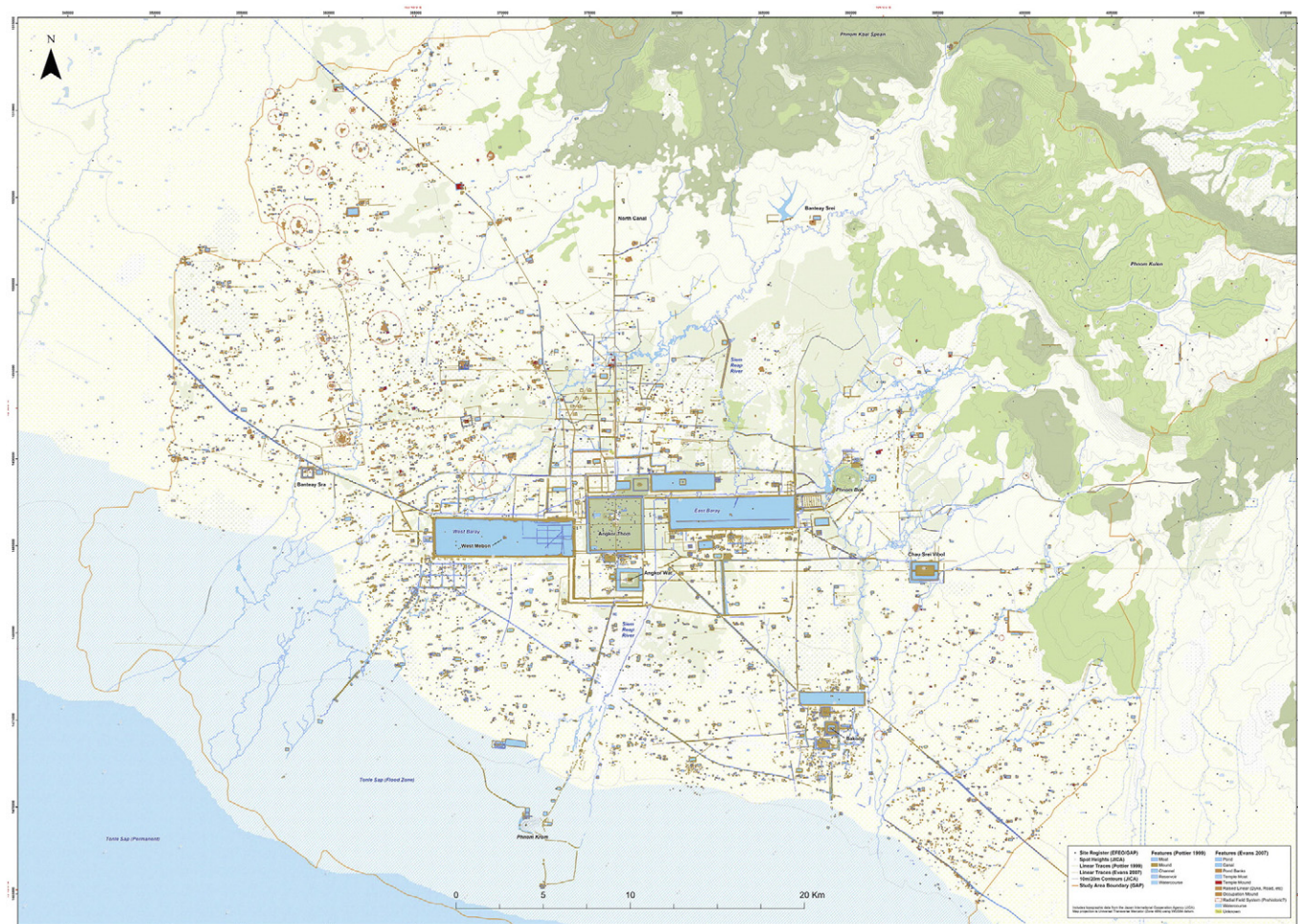


Fig. 2. Map of Greater Angkor (Evans and Pottier).

An early plan of the structure was made by the French archaeologist of the EFEO, Maurice Glaize, in the 1930s. It shows a causeway that leads to a central platform in the basin from the eastern gateway (Fig. 7). In the 1930s and 40s, the EFEO completely excavated the central platform of this shrine, after the West Mebon Viṣṇu and other artefacts were found there in 1936 (Glaize, 1936; EFEO Report of Works).

From December 1942 to December 1944, Glaize conducted extensive research on the Mebon. He cleared the central platform, uncovering its stepped construction (Fig. 8). Glaize reconstructed part of the wall and outer towers on the eastern wall (Fig. 9), rectifying damage from tree roots. Two of the towers, which were set into the wall, were still standing, and a third was restored at that time. Subsidence had caused instability in this tower and much of the wall. A sandstone wall linked the towers or gateways with windows at various intervals, decorated with an edging of continuous lotus petals (Fig. 10). The bases of some of the tower walls were still standing on the north (central and eastern towers), south (central tower) and east (northern tower) sides. Each gateway is square in plan, measuring 2.4 m externally and 1.28 m internally (Fig. 11).

The causeway that leads from the eastern gateway to a platform at the centre of the square pond is made of layered brick seen here in 2005 (Fig. 12). The central platform itself measures 9.65 m from east to west, and 8.65 m from north to south. During his excavations Glaize discovered two pits within the platform, known as the eastern and western shafts. A diagram by Dumarçay of the profile of the shafts can be seen in Fig. 13. The top of the causeway and the current surface of

the central platform are approximately 1.5 m lower than the top of the enclosing embankment (Fig. 14).

The eastern shaft, closest to the causeway, is a well-built masonry-walled square pit on sand foundations. There is a sharp drop-off at the end of the causeway where the eastern shaft begins in the centre of the causeway. It is clear that the causeway is not constricted immediately before the platform, as Glaize indicated (Glaize, 2005: 274), and it is unclear why he included this indentation in his drawings seen in Fig. 7. In the eastern shaft of the central platform under a stone slab and contained loosely within white sand was a ritual deposit. This included a golden leaf (D.B. 62), two golden plaques (D.B. 629), an amethyst 19 mm by 14 mm (D.B. 630) and two fragments of copper tubing 2.5 mm in diameter (D.B. 631) (*Journal de Fouilles*: V 16 1944: 14). These were found in the eastern shaft near the shared wall of the western shaft (Lagisquet 1936). In February 1944, Lagisquet also reported: 'After several days of work I abandoned this work after combing the gold diggers' diggings' (Lagisquet 1936). This quote and the history of the discovery suggest that the site had already been much disturbed by the local people, and that many important objects may have already gone missing by the time the French archaeologists arrived. EFEO records indicate that a small (bronze) statuette representing Viṣṇu, 14 cm high, was found in December 1936. It is described as being roughly finished. The Report of Works also records a small Nāga and a small female sculpture the same size as the (small) Viṣṇu. The location of these objects is currently unknown.

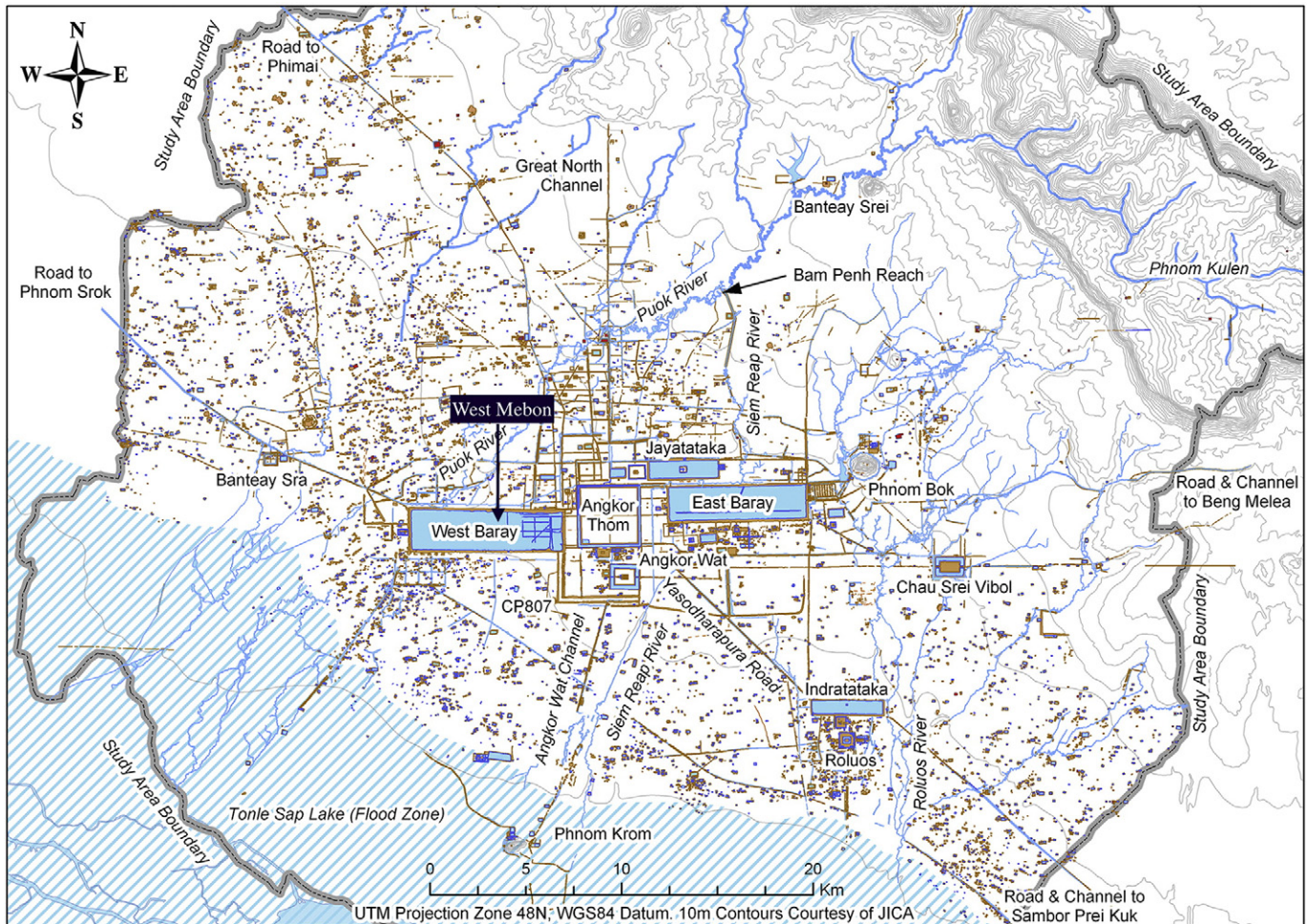


Fig. 3. The position of the West Mebon in the West Baray (Map Evans and Pottier).

The stone slab which was found above the ritual deposit is not typical of a ritual deposit stone. It is very rough on the underside and contains three holes. The middle hole penetrates right through the stone and the others only part way through seen from above and as a bifurcated illustration, Fig. 15. The slab was placed in a central position within the shaft floor and this may indicate it held some kind of ritual function. The perforation through the centre of the slab indicates it may have the dual purpose of being a drain for the eastern pit.



Fig. 4. The vast West Baray with the West Mebon at its center—view from the west (Evans).

The central part of the western shaft is more substantially constructed, faced by wedge-shaped sandstone blocks seen here cleared by the EFEO in 1936 (Fig. 16a). It is surrounded by a rectangular wall, which is unstable and may have been built by the EFEO in the 1930s as a temporary repair. The first section of the circular shaft is 55 cm in diameter and is octagonal. The next section is circular and is about 1 m deep. At its widest point the shaft is estimated at 110 cm. The entire shaft from ground surface to bottom is over 2 m deep. A precise measurement is difficult as the upper portion and the western side of the shaft have been destroyed. The EFEO documented the two shafts and the structure of the western shaft in 1936. Those excavations also revealed a large, roughly cut, in the bottom of the western shaft seen in Fig. 16b.

Jacques Dumarçay made a diagram showing the internal structure of the eastern and western shafts (Dumarçay and Smithies, 1998: 6). He proposed that the western shaft was an inverted *linga* and that a copper pipe, which presumably performed some hydraulic function, led from the western shaft to the *baray*. This idea has not been substantiated. However, the presence of small pieces (2 cm in diameter) of copper pipe (found in the eastern shaft) may indicate there was a hydraulic configuration between the western and eastern shaft.

It was in this western shaft that Glaize discovered the remaining fragments of the West Mebon Viṣṇu in 1936 (Fig. 17). As Glaize notes in his *Report of Works*, the walls of the western, southern and part of the northern side of the central platform had been dismantled before the Viṣṇu was buried, in order to enter the large bronze (Glaize, 1936). Although the sculpture may have been interred carefully at the time of burial, much debris was found on top of it (about 1 m thick), including



Fig. 5. The West Mebon in the baray- dry season (Evans).

pieces of bronze, ceramics and other debris that suggest it had been at least partially disturbed by looters and then reburied.

3. Archaeology

The eastern wall of the West Mebon was initially restored by the EFEO in the late 1930s to 1940s using the anastylose restoration technique. Since then the lintels, walls and towers have become much degraded and are scattered across the island. In 2005 the Greater Angkor Project team from the University of Sydney investigated the site. Two of the towers and part of the eastern wall were still intact at that time. Investigations were made in the central part of the Mebon, primarily dealing with the two shafts found at the end of the causeway. Core samples (Fig. 7) were taken from the pond in 2005, providing new evidence for restorative work at the Mebon (Penny et al., 2005).

The two shafts at the end of the causeway were re-excavated at that time. The water that filled both the shafts, was pumped out and the blocks and sand that filled the lower third of the shafts were removed. The eastern shaft was cleared, and the paved floor of the shaft was

exposed (Fig. 18). Identified at the time by Christophe Pottier was the fact that one of the blocks in the wall of the eastern shaft displayed pre-Angkor-style carving that had eroded, indicating it was a re-used block from an earlier monument. The bottom of the circular western shaft could not be reached because of water percolation through the platform from the surrounding basin and the unstable nature of the shaft walls, which had been partially reconstructed by Glaize after the exhumation of the West Mebon Viṣṇu in 1936.

Fig. 18 also shows the curved masonry border of the western shaft, which is clearly forming part of the base level of the eastern shaft. The western wall of the eastern shaft is therefore positioned to form a chord across the original structure of the western shaft. The western wall of the eastern shaft is carefully constructed so that the squared blocks interlock with the masonry of the circular western shaft, leading



Fig. 6. Looking from the central platform to the eastern gateway of the West Mebon (Feneley).

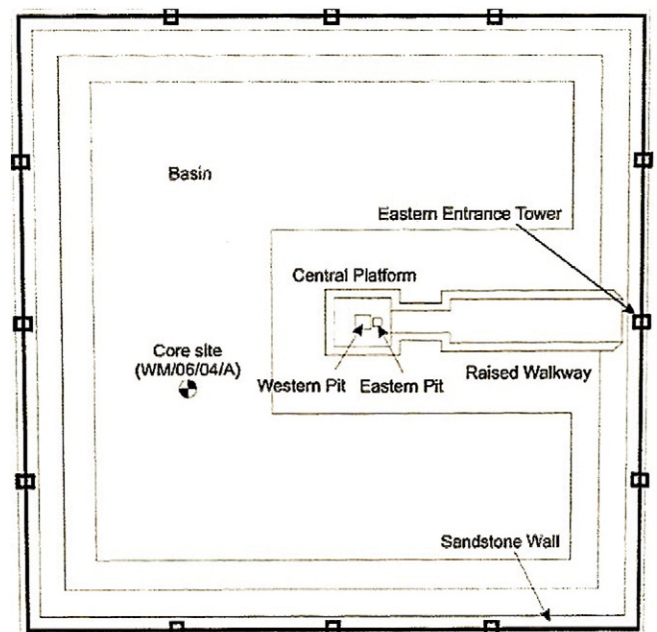


Fig. 7. Plan of the West Mebon (Image Glaize) with additional core sites from Penny 2005.



Fig. 8. The stepped walls of the central platform 1936 (Image EFEO).

to the suggestion that the eastern shaft was a later addition (Fletcher et al. 2005). This raises an interesting question about the interment of the West Mebon Viṣṇu in the western circular shaft, and the alterations and addition of the eastern pit. One hypothesis is that the Viṣṇu was placed on a new purpose-built platform over the western shaft and that the two shafts were linked structurally and with symbolic significance.

The artefacts and archaeological features that have been investigated indicate that the West Mebon Viṣṇu was not the only installation in this central shrine – another deified object had been installed previously. The core samples taken from the West Mebon pond further support this idea, with clear indication of a restoration of the temple and its pond in the 12th century (Fletcher et al., 2005).

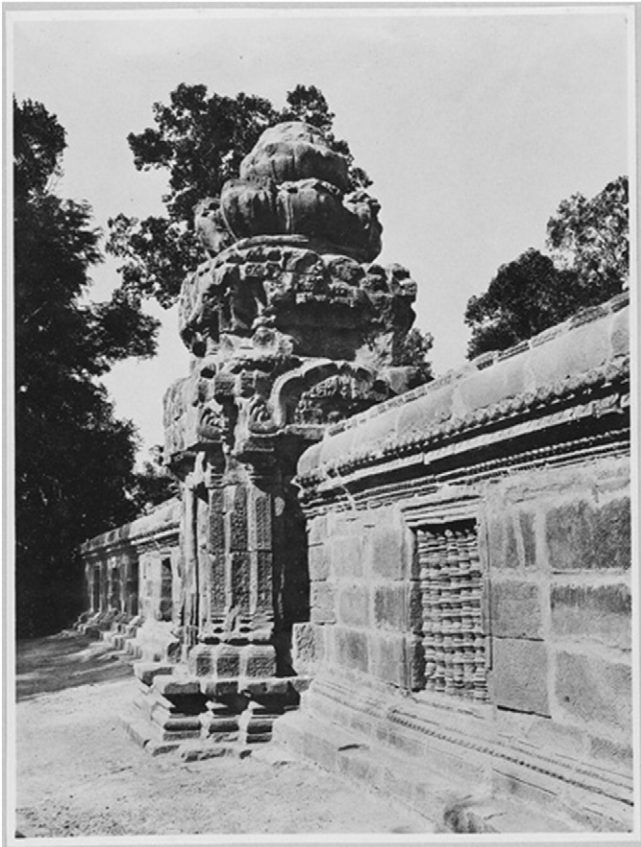


Fig. 9. The restored wall and tower of the West Mebon 1940 (Image EFEO).



Fig. 10. Detail of lotus pattern of the West Mebon Wall 2010 (Feneley).

In 2013–2014 the EFEO began archaeological investigations with a view to a total restoration of the monument which is flagged for completion in 2018.

4. Dating issues

The building of the West Baray was an enormous undertaking that required a large labour force and a long period of time to create. A large area of the 7th and 8th century landscape was flooded, and many buildings and other infrastructure were destroyed by, or buried within, the great earthen dykes. The massive pyramid temple of Ak



Fig. 11. The West Mebon eastern tower 2005 (Feneley).



Fig. 12. The built up causeway leading to central platform in 2005 (Fletcher).

Yom was almost entirely buried in the western end of the *baray* during its construction (Pottier, 2000: 136). Whether the central tower was still used after the burial of Ak Yom in the southern dyke of the West Baray is not known, but it illustrates that the bulk of the structure of a monument, due to old animosities or engineering needs, was sacrificed to the constructions of a subsequent regime. The epigraphy of Ak Yom indicates that it was still in use in the year 1000, and this has been used to date the *baray* to the reign of Sūryavarman I.

Sūryavarman I (1002–1049 CE) was possibly a Buddhist who had the posthumous name *paramanirvānapada*. After the civil war with Jayavīravarma ended in 1010 CE, the victorious Sūryavarman I built his royal palace at Angkor Thom, and may have begun the West Baray (Jacques, 2003: 11), although we have no epigraphic evidence to support this. The Mebon in its centre must have been constructed after the West Baray. Groslier suggested the construction of the West Baray may have begun under Sūryavarman I and was merely completed by Udayādityavarman II (Groslier, 2008 [1979]: 20).

Generally, it is assumed that the West Baray and the West Mebon (or part of the Mebon substructure) were built at the same time (Penny et al., 2005). However the exact date of the construction of the West Mebon is not known. The bas-reliefs of the West Mebon, remnants of

which can be seen to line the walls of the temple gates, are considered to be in the style of the Baphuon, based on a comparison with the style of the bas-reliefs on the Baphuon temple, which is attributed to the successor of Sūryavarman I, Udayādityavarman II (1050–1066 CE). The reign of Udayādityavarman II marked the beginning of a long period of conflict. During his time in power, there was constant political turbulence in the Khmer Empire and also conflict with Champa (Vickery, 2001: 98). The inscription of Prāḥ Ngouk, K. 289 (1066 CE), found near the Baphuon, records three major revolts by military leaders (Vickery, 2000: 178). Woodward points out that the wavering stability of the realm at this time was marked by religious vicissitudes (Woodward, 1997: 75).

A recent study indicates that the Baphuon temple may be older than previously thought. AMS radiocarbon dating of structural iron crampons indicate the Baphuon may have been built by Sūryavarman I and then occupied at a later date by his son, Udayādityavarman II. This is an example of the widespread alteration, reconsecration, and re-use of temples throughout the history of Angkor (Leroy et al., 2015).

Prior to the current restoration of the West Mebon by the EFEO, the structure of the Mebon was very unstable (Fletcher et al., 2005). Despite a partial anastylosis reconstruction carried out by Glaize from 1942 to 1944, the West Mebon temple remained largely in disrepair. The Mebon walls were collapsed, there were stones scattered across the island and much of the structure was missing. Some of the stones observed in 2005 were large and curved and may configure into a larger stone object perhaps a large *liṅga* (Fig. 19).

The University of Sydney Greater Angkor Project (GAP), conducting investigations in 2005, found a number of stones that seemed to fit together, possibly to form a platform, which can be seen at the end of the causeway in (Fig. 20). One observation that can be made when looking at these images is that the detail on the walls of the West Mebon and the detail of the lotus design on the platform blocks are similar. This can be seen when comparing Fig. 20, which shows the detail of the platform design, with Fig. 10, depicting the external wall of the Mebon. Therefore a compelling hypothesis is that the external wall and some of the blocks found at the central platform shown here were created at the same time and earlier than the West Mebon Viṣṇu.

Sediment cores taken from the Mebon's basin provide another perspective on the age and renovation of the West Mebon (Penny et al., 2005; sampling site is shown in Fig. 7). The aim of this work was to

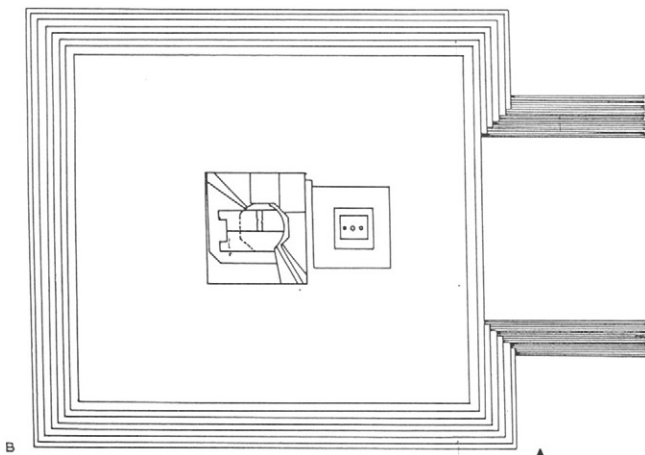


Fig. 13. Plan of western and eastern shafts (diagram Dumarçay).

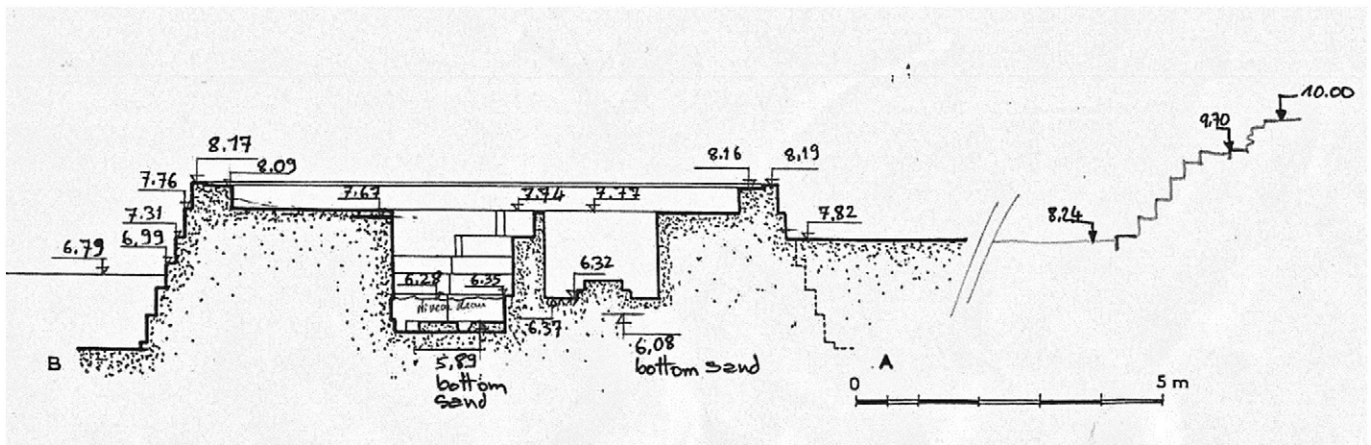


Fig. 14. Profile of the western and eastern shafts with measurements from GAP 2005 (diagram Dumarçay 2005).

identify changes in the ecology of the Mebon over time as water levels in the surrounding *baray* changed. Microscopic pollen preserved in the Mebon's sediment, including pollen of the sacred lotus, *Nelumbo nucifera*, are consistent with lotus growing in a deep, clear-water pond during the 11th to 12th century, indicating the *baray* was operating at or near capacity during this period (Penny et al., 2005). An independent chronology provided by radiocarbon dating indicated that sedimentation within the basin did not begin until the 12th century, long after the supposed construction of the shrine. In accounting for this discrepancy, Penny and co-workers state:

... this new radiocarbon age post dates the probable date for construction of the West Mebon by more than a century. This discrepancy is due to a lack of deposition in the pond during the first half-century or so of its existence, or may be due to the cleaning out of the Mebon basin in the early to the middle of the twelfth century in order to increase or maintain its capacity.

[(Penny et al., 2005: 9)]

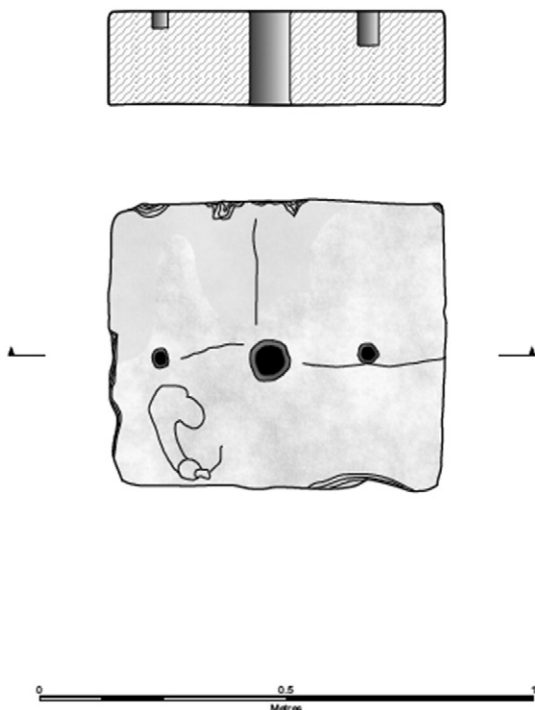


Fig. 15. Bifurcated illustration of the slab found in the eastern shaft (GAP).

They suggested, provisionally, that the restoration may have been associated with the major architectural engineering developments of that century ascribed to Jayavarman VII. However, it is more likely that this restoration took place in the early stages of the reign of Sūryavarman II, when he restored the West Mebon and consecrated it with the Viṣṇu Anantaśāyin, symbolically taking control of the largest body of water at Angkor. At this time, it is possible he integrated the West Baray into a new hydraulic network that, later in the 12th century, put Angkor Wat at a pivotal point within the city. Penny and colleagues state that the presence of pollen from freshwater swamp plants from around the 16th century indicates that the Mebon had fallen out of use by this time (Penny et al., 2005: 11). It is possible that the West Mebon Viṣṇu had been deconsecrated or disposed of by this time.

4.1. Sacred carvings at the source of the hydraulic system of Angkor

Groslier linked the development of the West Baray to the capture of the O'Klot River (Siem Reap River) at Bam Penh Reach (Groslier, 2008 [1979]: 6–7). Believing that the carvings found at Kbal Spean were mostly attributed to the 11th century, Groslier put forward another theory linking the carvings with alterations to the hydraulic network from an earlier date (Groslier, 2008 [1979]: 21). First, he suggested that the capture of the O'Klot could be linked to the time of Yaśovarman and, second, that the *liṅgas* and carvings of Viṣṇu found at Kbal Spean on the Kulen Hills were also linked with Yaśovarman, or could be earlier, because Jayavarman II had his religious centre, the city Mahendraparvata, on the Kulen. The recent Lidar survey (Evans et al., 2013) has given clarity to the location and scale of this city, and subsequent dating of Mahendraparvata's reservoirs (Penny et al., 2014) indicate significant changes in water management practices on the Phnom Kulen plateau from the 12th century.

Groslier hypothesised that the capture of the O'Klot river at Bam Penh Reach may have occurred at the end of the 10th century, and that it may have been the *tripatha Gaṅgā*, which Rājendrarvarman is said to have 'tamed' in the epigraphy (Penny et al., 2014). These ideas do not seem to have been taken up by other scholars, and Pottier argues that the river was diverted (or created) later than the 10th century (Pottier, 1999: 100–101, 2005: 51). It is also generally accepted that the carvings (Fig. 21) found on the Kulen and Kbal Spean date from the 11th century, and that some may be later (Jacques and Dumont, 1999; Chevance, 2005). Certainly inscription (K. 1011,3) dates to 1059 CE and says King Udayādityavarman II, consecrated a stream, and erected a *liṅga* at Kbal Spean. However, the main thrust of Groslier's argument was clear: the carvings of Viṣṇu Anantaśāyin, Śaivite *liṅga* at the source of the river, may have been created at the time of some significant restructuring of the hydraulic network of Angkor. As the

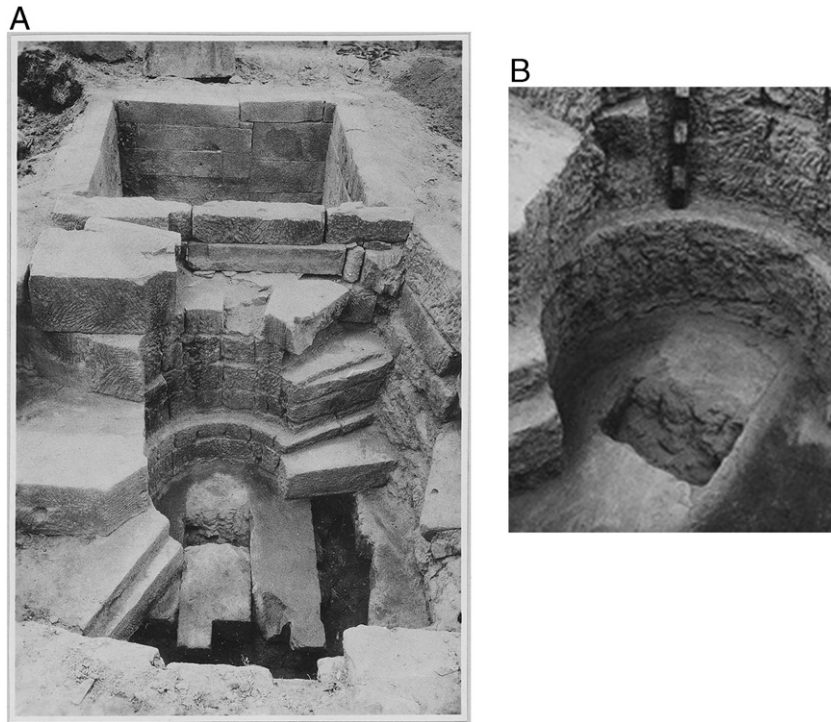


Fig. 16. Eastern and Western shafts in 1936 (EFEO).

changes of the hydraulic network and architecture of Angkor were frequent, these carvings may well have taken place at various intervals over a number of centuries. The high frequency of the depiction of Viṣṇu Anantaśāyin at the source of the water feeding the hydraulic network of Angkor emphasises its role in water sanctification. The massive depiction of the same iconography in bronze and gold installed in the Mebon would have acted as both a sacred affirmation and territorial claim to the largest body of water in Angkor.

5. The situation in the West Baray

Dumarçay first discussed the alteration to the inlets and outlets of the West Baray in 1982. He believed rates of sediment accumulation in the *baray* had accelerated in the 12th century, displacing floodwater

and ‘placing the Mebon under 2 m of water’. He suggested that this situation prompted Sūryavarman II to install a water intake channel in the south-east corner of the reservoir (Dumarçay 1982:103). However, these claims are problematic because the bed of the *baray* is the original ground surface on which the *baray* was built, indicating very little sediment accumulation since the *baray* was emplaced (Fletcher and Pottier 2002; Fletcher et al., 2003, 2008). Pottier also refuted Dumarçay’s idea of a displacement of the eastern dyke (Pottier, 1999 in footnote 277: 548).

Penny et al. (2005) suggested, on the basis of palaeobotanical data from the Mebon basin, that the *baray* was fully or partly dry by the end of the 12th century. No such evidence was apparent in a later study by Day (2012), based on a core from the south-west corner of the *baray* itself. The authors suggest this discrepancy between the two records can be accounted for by the greater length and time-span of the *baray* core relative to the Mebon core, by the buffering effect of the Mebon dykes on the ecological response to water level change in the Mebon basin, and by the different locations of the two sites in terms of a common reservoir sedimentation model. The first of these



Fig. 17. The head and shoulders of Viṣṇu upon discovery in 1936 (EFEO).



Fig. 18. Overlapping structure of the Western wall of the Eastern shaft (Fletcher).



Fig. 19. Curved blocks scattered across the island 2005 (Fletcher).



Fig. 21. Viṣṇu Anantaśāyin and Śaivite liṅga on the river bed at Kbal Spean.

arguments can be dismissed, because both records incorporate the period of interest (late 12th and early 13th century). The buffering effect of the Mebon dykes, and the possible input of groundwater to the Mebon basin, certainly reduces the sensitivity of the Mebon record to small changes in water level in the surrounding *baray*, but ensures that hydrologically-driven ecological change, when it does occur, likely reflects large and prolonged changes in water level. Day (2012) claim that the counterintuitive recovery of a 2-m sediment sequence from a reservoir known to have infilled by less than 50 cm is due to the preferential sedimentation of fine sediment at the lowest part of the reservoir (the south-west corner), as one might expect in a large reservoir. However, the slope is insufficient to explain sediment accumulation of this magnitude against the southern and western dykes. Day's core was taken from the borrow pit that runs along the inner wall of the reservoir, the spoil from which was used to create the reservoir dykes (Kummu, 2008). Sedimentation in the reservoir proximal to the earthen dykes is dominated by re-suspension of fine sediments as a result of wind-driven wave action rather than by supply of sediment from the intake channel, some 8 km to the north-east. The location of the core site in the borrow pit of the *baray*, and the high rate of sediment supply from the proximal earthen dykes, explains the thickness of material accumulated in this part of the reservoir. Moreover, the location of the core site in a ditch at the lowest part of the reservoir ensures that changes in

water level in the *baray* will not be recorded unless the *baray* is completely dry. The record of Penny et al. (2005) and Day (2012) from the Mebon and *Baray* respectively can be reconciled because the Mebon record is responding to the partial drying of the *baray* from the end of the 12th century, whereas the downstream south-west corner of the *baray* retained water throughout this period.

5.1. The iconography of the West Mebon

The West Mebon temple is considered to be in the Baphuon style, although the layout of the temple is unusual compared with the structure of other temples of this style in Angkor. In plan view the Mebon's large square enclosure and causeway link to the eastern gateway. Aerial photographs indicate that it may have represented a giant *yoni* (Fig. 5), and an early configuration of the central platform may have included a giant *liṅga* at its centre. This was documented in the GAP report of 2005 (Fletcher et al., 2005). On a macro scale the importance of the symbolism is reinforced by the fact that the Mebon is placed in the absolute central axis of the Western *Baray*.

The walls that create the Mebon are built with sandstone, and have chains of carved leaves and lotus petals in lines; a feature that can also be seen on the tympanums. Between each of the gateways there are windows with bars or pillars through which it is possible to catch a glimpse of the central platform. The landscape is scattered with tiles,



Fig. 20. The oval platform located on central platform of the West Mebon 2005 (Fletcher).

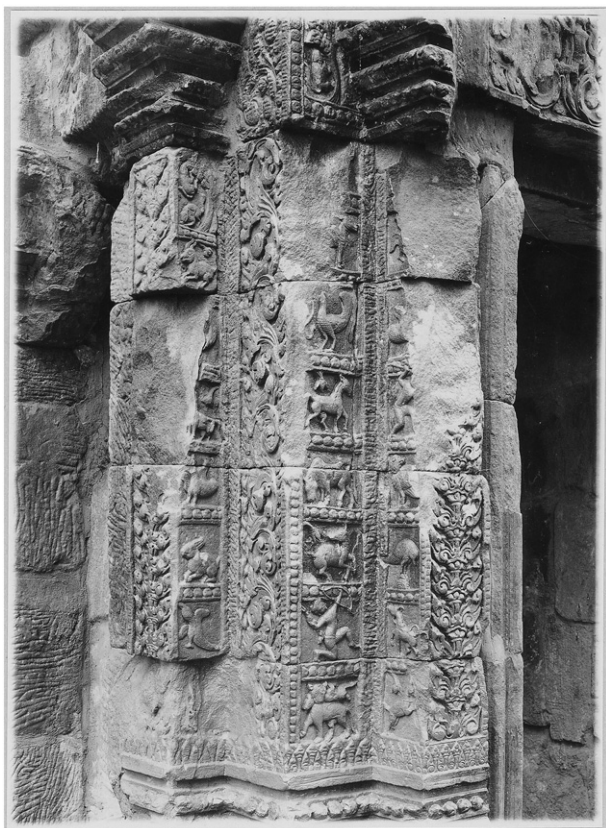


Fig. 22. West Mebon bas-relief 1936 (EFEO).

which may indicate that a roofed structure existed there at some time (perhaps to protect the Viṣṇu). *Nāgas*, although eroded, line the frontons at the top of the gates. The gateways are covered with small square boxes stacked on top of one another, each depicting an animal (including birds, cocks, rabbits, bulls and horses). At times, the heads of the animals are missing because the frame of the square cuts off the depiction of the creature (Fig. 22). Each of these depictions is framed within a box, and a similar device is seen on the walls of Baphuon. The exact meaning of these animals is unknown but they may have been some kind of calendric reference. The Khmer were aware of the duodenary cycle, which is seen in Khmer epigraphy from the 7th century. Coedès wrote a convincing article about this influence in Khmer iconography,

proposing a Chinese influence (Coedès, 1935). The depiction of various animals aligns with a hypothesis that the carvings on the walls of the temple are contemporaneous with a former Śaivite installation at the West Mebon. In some incarnations, Śiva is worshipped as the god associated with animals, the 'Lord of the animals', Śiva-Pāsupati (Kramrisch, 1981: 98–99).

5.2. Digital visualisation of the West Mebon

A digital visualisation was made of the temple in order to understand the format of the West Mebon based on these structural and architectural cues. The initial visualisation of the West Mebon (Fig. 23) was based on journal entries and plans of Glaize (Glaize, 1936 *Journal de Fouilles* (V13), Glaize, 2005: 273–274). To simulate some of the atmosphere of the temple the stepped walls of the Mebon can be seen reflecting in the water. Flags were added to the towers and incense smoke from the pious offerings in the towers. Both features sought to indicate the windswept atmosphere of the middle of the *baray*. The water temple was situated so as to appear to be floating freely in the *baray*. However, there were obvious logistical difficulties with the West Mebon being completely surrounded by water (where, for example, did people stand to worship the sculpture?). In 2013, Royère suggested that the eastern island that presently abuts the square enclosure may have been part of the original design, and was not a later addition as has long been thought (Pascal Royère pers. Comm, November 2013). According to Royère, the island provided a place for people to access and service the temple, and may have provided space for the West Mebon Viṣṇu to be cast on site. In subsequent visualisations the Mebon and the island were made to look more substantial than had been previously thought (Fig. 24). The causeway was also straightened to remove the indents close to the central platform recorded on the plans by Glaize, which were not substantiated in subsequent investigations. At the same time the digital visualisation of the West Mebon was being formulated, investigations and a visualisation into the massive bronze Viṣṇu, which had once been placed in its centre, were being made.

5.3. The West Mebon Viṣṇu

In 1936 fragments of the large bronze West Mebon Viṣṇu were found in one of two shafts located in the central platform (the westernmost shaft) of the West Mebon. In Fig. 1 the impressive bronze sculpture is depicted with archaeologists Henri Marchal, Maurice Glaize and an unidentified Khmer man. The remains of the Viṣṇu were found buried 1 m below the surface in the western shaft. The West Mebon Viṣṇu



Fig. 23. Visualisation 1: The West Mebon.



Fig. 24. Visualisation 2. The West Mebon.

was found shattered into many large and small fragments found interred beneath the head and shoulders.

The bronze sculpture itself is over 6 m long and is considered to be one of the finest examples of Khmer sculpture yet discovered. Records from 14th December 1936 indicate that rings and jewels, said to come from the West Mebon, were being sold on the black market in Siem Reap (*Journal de Fouilles* 1936–1937 (V13): 156–157). Some of the fingers of the Viṣṇu had been torn off. A bronze finger was given to the EFEO by Chitlat, the Khmer man who led the EFEO to the Viṣṇu.

The fact that its crown and most of the belt had been removed may indicate that those parts of the body that were covered in gold leaf were also taken, but this is more likely to have occurred at the time of the initial interment. This has implications for the burial of the sculpture as it indicates that it was an important and respected icon, and that it had been buried in a formal de-consecration ritual, rather than carelessly discarded into a pit.

The discovery of such an impressive bronze sculpture in a water shrine in the middle of the West Baray has far-reaching implications of historical significance, and needs to be related to the position of the West Mebon in the hydraulic network and the cosmological symbolism of Angkor.

If this were the sculpture spoken of by Zhou Daguan in the late 13th century, it was a sacred object that had gained legendary status. It is unlikely that Zhou Daguan saw the object himself, and his observations of the sculpture being in the east may be due to a misinterpretation of its position.

Analysis of the various pieces of the West Mebon Viṣṇu and its ensemble helped to establish its likely iconography and placement in the West Mebon. An examination of the remaining fragments, particularly the head and upper torso and the large left leg fragment, was sufficient to conclude that the West Mebon Viṣṇu is a statue of Viṣṇu Anantaśāyin. With a view to the iconography of this particular *mūrti* of Viṣṇu the decision made regarding the fundamental pose of the Viṣṇu, it was possible to construct a 3D wire-frame computer model (Using 3D Max software). The wire model was based on the comparative study of the database which was collated for this project including the iconography of 300 examples of Khmer and Cham depictions of reclining Viṣṇu dating from the 5th century to the 14th century. Details about the fragments of the Viṣṇu, and the digital reconstruction of the sculpture which point to a later date of construction for the Viṣṇu will be the subject of another paper.

5.4. The Reachisey

The next problem to be addressed was the bed of the Viṣṇu. The sculpture of Viṣṇu without *Ananta* (*Śesa*), the endless serpent, or its Khmer counterpart the *Reachisey*, would no longer be a depiction of Viṣṇu Anantaśāyin. The surviving fragments do not (at this stage) include evidence of a *Nāga* or a *Reachisey*, but there is no precedence in Khmer iconography for the depiction of Viṣṇu Anantaśāyin without either of these components. We can be confident that such a bed existed because placement of the Viṣṇu flat against the platform is not consistent with the Khmer iconography or the meaning of Viṣṇu Anantaśāyin. The Brahmanic creation story of Viṣṇu Anantaśāyin is that Viṣṇu, having been awoken by Lakṣmī holding his feet, gives birth to a lotus from his navel, on the lotus Brahmā is sitting in meditation. Brahmā looks to the four cardinal directions and becoming aware of Viṣṇu (the universal creator), emits the sound OM and creates the world (Rao, 1997).

The oval-shaped platform which had been observed by the GAP team seemed to be the structural shape on which the Viṣṇu may have rested (Fletcher et al., 2005). This oval platform is large enough to have been the structure on which the Viṣṇu was placed however some of the stone seemed unfinished. It may be however, only the core of an elaborate *Nāga* or *Reachisey* on which the Viṣṇu rested. The West Mebon Stele (D.B. 3.976) found in the West Mebon depicted Viṣṇu Anantaśāyin reclining on a *Reachisey* (Fig. 25). Lakṣmī is depicted with an Angkor Wat style crown, indicating this stele is 12th century.

The term *Reachisey*, was first posited by Boisselier to describe the composite creature that was part crocodile and part dragon, with a lion's head and occasionally an elephant's trunk (Boisselier, 1966: 320). This composite animal, which occurs in 12th century imagery of Khmer art, is a crucial focal point in the iconography of Viṣṇu Anantaśāyin. It can be seen mostly in iconography related to water. An example of this is seen at Phimai, in which a lintel depicts mirror images of the *Reachisey* with the crested heads also seen at Beng Melea, surrounded with aquatic plant life and supporting a boat. At Angkor Wat, *Reachisey* are found cut to pieces, and also at times undamaged in the cosmic ocean in the 'churning of the sea of milk'.

The earliest of these depictions of the *Reachisey* seem to have come from the northern part of the Khmer Empire in the 12th century. A map illustrated in Fig. 26, shows the distribution of this iconography across the Khmer Empire, with particular groupings in the north near Phimai and at Angkor. Imagery of this kind is found as far north as



Fig. 25. The West Mebon Stele (EFE0).

Prang Ku Suan Taeng; this 12th century monument being located in Buriram Province present-day Thailand. In the south of Cambodia, it is also seen at Phnom Da, indicating that this imagery stretched across the empire. The highest concentration of this iconography occurs around Angkor.

The only other known example of Vishnu Anantaśāyīn in the round depicts Vishnu reclining on a *Reachisey*. The stone sculpture was found at the *Terrasse Bouddhique* (north-western corner of Angkor Thom site 388 IK: 488) and is a fine example of the Angkor Wat Style which dates to the 12th century. Vishnu has been fractured and the remnants of his two arms one holding the orb are all that is left.

5.5. Orientation of the sculpture

In general, west is the direction associated with Vishnu. However, the installation of a reclining Vishnu may have its temple facing in any of the cardinal directions. The orientation of the sculpture to the cardinal points is considered important and symbolises different properties.¹ The Indian *Mayamata* text on architecture and iconography indicates the correct installation of Vishnu Anantaśāyīn should be thus: ‘The head of the god is to be in the east or the south.’ (*Mayamata* trans. Dagens, 1995: 344).

Rao states that if a Vishnu *śāyana* form of Vishnu is to be installed with the temple facing to the east or west, the head must be to the south (Rao, 1997 [1914]: 22). Because the Vishnu is reclining on its right side, the injunction that its head be positioned to the south necessitates that the sculpture faced towards the east, in the direction of the causeway as seen in digital visualisation (Fig. 27). This seems a practical solution because worshippers and priests could approach the sculpture from the eastern gateway. There is no indication that there was any method of accessing the sculpture from the west, which would also have resulted in the head being placed to the north, for which there appears to be no precedent. Although a walkway traverses the external perimeter of the wall of the Mebon, it seems improbable that the only way to gaze upon the face of the Vishnu would have been through the windows of the western wall, which were barred with balustrades. Furthermore, there is no precedence for a sculpture of Vishnu Anantaśāyīn having its back to the main entrance of the shrine in India or Cambodia. In the visualisation in Fig. 28 the sculpture is viewed through the eastern gateway; the smoke blowing is from incense, to simulate the presence of pious offerings to Vishnu.

In Khmer temples, lintels depicting Vishnu Anantaśāyīn are found on doorways facing each of the cardinal directions and, in the case of Angkor Wat, there are four examples, each facing a different way. The fact that the Mebon itself faces to the east rather than west further enhances the argument that this had originally been a Śaivite temple.

Looking at this problem from the point of view of the Khmer bronze manufacturers and artists who were commissioned to create the sculpture, their main difficulty would have been emplacement of Brahmā. In many bas-relief depictions of Vishnu Anantaśāyīn, the umbilical cord is an insubstantial thin line; on top sits the depiction of Brahmā, impossibly large for the support of the umbilicus. However, this is impossible to indicate in three dimensions if Brahmā is to be substantial. In India, the artists solved this problem using a back wall, on which Brahmā was painted or carved behind the reclining Vishnu the *bhōgaśāyana* reclining Vishnu of the Malayadiitpatti Anantha Padmanabhaswamy temple (Rao, 1997: 87).

¹ ‘If the temple faces to the north, the head of the reclining image must be to the east. if it faces to the south, the head must be placed in the west; in temples facing east and west, the head must be in the south. This means that in cases, in which the temples face the north, the south or the east, the head of the reclining figure of the deity is to the left of the worshipper; and only in the case of temples facing the west, the head of the deity is to the right of the worshipper’ (Rao, 1997 [1914]: 22–23).

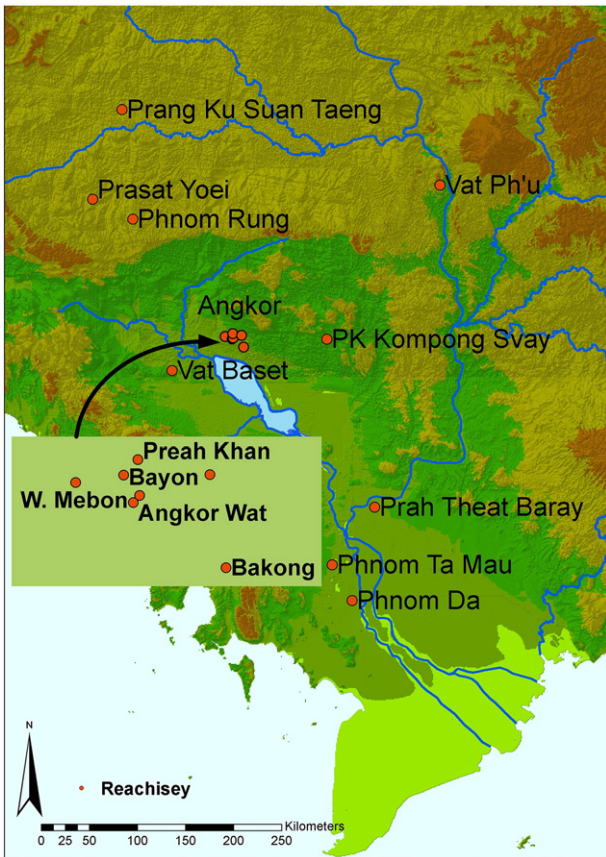


Fig. 26. Temples with lintels depicting Vishnu Anantaśāyīn reclining on the Reachisey (Lustig).

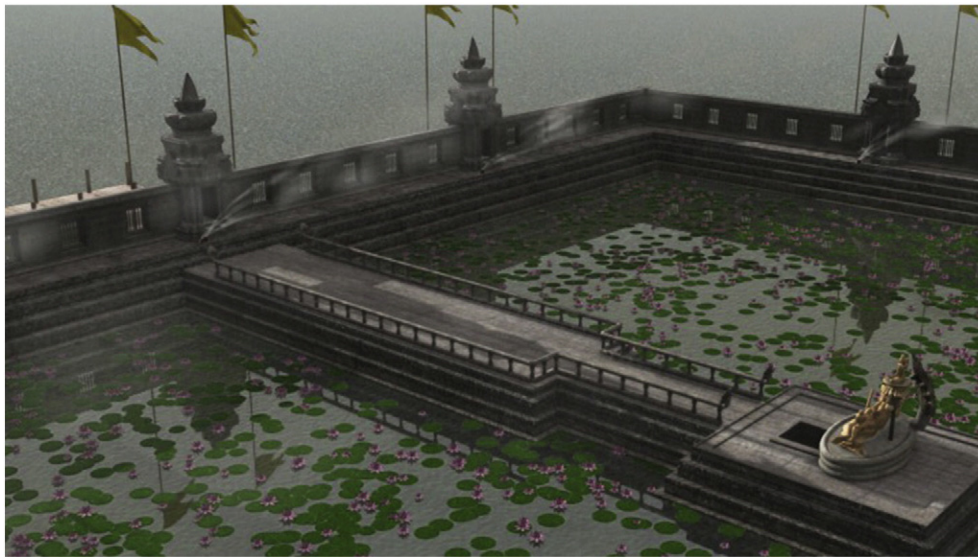


Fig. 27. Visualisation of possible emplacement of the Viṣṇu.

The ingenuity of the Khmer artists was to create a solution to this problem in a three-dimensional object. Archaeological and iconographical evidence suggest that they placed Brahmā on a strong, thick pole behind Viṣṇu (Feneley, 2015). Iconographic evidence for this can be seen in the bas-reliefs of Phnom Rung (Fig. 29), the western *gopura* of Angkor Wat on the inner pediment, the central shrine south entrance of Angkor Wat, Bantay Samre, Prang Ku Suan Taeng, Prasat Sneg, Prah Pithu, Wat Lovea, Po Romchang and Prasat Yoei. There are many other examples that may have also displayed Brahmā on a pole, but from which both Brahmā and his link to Viṣṇu may have been erased.

In all the depictions listed above, the umbilicus is no longer supporting Brahmā. The umbilicus of Viṣṇu has either diminished to become a thin band, which falls to the front, or is non-existent. In almost all of these cases, the *Reachisey* is present as the couch of Viṣṇu. Two points become apparent when looking at these examples. First, that all the depictions date from the 12th century onwards and, second, that many of these depictions are located in the northern areas of the former

Khmer Empire. Phimai and its northern area have been postulated as a possible location of a place called Mahīdarapura. This area may be the origin of the Mahīdarapura Dynasty (1066–1050+) which wrested control of Angkor from the son of Udayādityavarman II and which included Jayavarman VI, Dharaṇīndravarman I, and Sūryavarman II (Jacques and Lafond, 2007: 201).

Examples of Viṣṇu reclining in bas-relief lintels date from the early history of the region, examples from the 6th century, come from Mi-So'n E1 and Phu-Tho, from the 8th century the Co Luy Citadel lintel (all sites found in current day Vietnam), another important example is the lintel from Tuol Baset (Cambodia). No depiction of Viṣṇu Anantaśāyīn with Brahmā on a thick supportive pole is seen before the 12th century. The umbilical cord when represented as a thin waving stem that lies across the body of Viṣṇu and which supports the weight of Brahmā would have been physically difficult to represent in three dimensions. A practical solution to this problem would be to place Brahmā on a pole behind Viṣṇu in the three-dimensional representation of Viṣṇu



Fig. 28. Visualisation: The West Mebon Viṣṇu viewed through the eastern gateway.



Fig. 29. Viṣṇu Anantaśāyin from Phnom Rung with Brahmā on a pole.

Anantaśāyin. This is what is depicted in the Cambodian bas-reliefs of this creation myth from the 12th century onwards.

There are archaeological reasons to conclude that these depictions may have been of the West Mebon Viṣṇu. First, if the Viṣṇu is emplaced on a *Reachisey* or on a *Nāga*, or both, on top of the western shaft, there would be no need to change the western shaft. Rather, the Viṣṇu could be placed on its platform directly across the western shaft, with support material on either side if necessary. Secondly, a position for Brahmā is available as the base of the western shaft shows evidence of having a hole hacked into it, as is clearly seen in Fig. 16a & b. If a pole arose from the centre of the western shaft, it could have arisen immediately behind the small of the back of the Viṣṇu if the statue and its ensemble was brought slightly forward on the western platform so that the navel was aligned with the western edge of the eastern pit.

The archaeological work by the GAP in 2004–2005 points to a re-use of the western pit. Matching hemi-circles of stone of the correct dimensions were found at the site. Their original position is uncertain but it seems likely they were placed within the western pit with a rectangular hole at the centre of the resulting stone circle. This shape indicates that a pole of substantial dimensions may have fitted into this position and slotted into the rectangular hole hacked into the bottom of the western shaft. This may have been one way the artists solved the problem of installing Brahmā floating behind the reclining Viṣṇu.

5.6. The navel of Viṣṇu.

Dumarçay believed the West Mebon Viṣṇu to be a ‘kind of nilometre’ that measured the water level of the surrounding *baray*. He suggested that the West Mebon was originally a Śaivite shrine. The western shaft and its three-tiered shape became an inverse *liṅga*, ‘something like the reflection of an upright *liṅga*’, and was connected to the *baray* by a bronze pipe ‘using the principle of communicating vessels the level of water in the *baray* could be ascertained’ (Dumarçay, 2003: 52).

In his view, this inverted *liṅga* communicated water via a bronze conduit to the *baray*. Thus, as the *baray* filled, the western shaft of the West Mebon became a hydrometer indicating its level (Dumarçay, 2003). The inverted *liṅga* filling with water became a ‘symbol of the creative force of the god’. He states that the shrine then became Vaiṣṇavite ‘and for that a bronze statue was erected showing Viṣṇu, sleeping on the waters’ (Dumarçay and Smithies, 1998: 5).

Dumarçay proposed that a hydraulic network was needed to ensure that water was emitted from the navel of the West Mebon Viṣṇu (Dumarçay, 1997; Dumarçay, 2003). He suggested that it may have been possible for the shrine and the sculpture to function under hydraulic pressure from the *baray* to enable water to flow from the navel of the sculpture. In light of the hydraulic theories of Dumarçay, Royère has

suggested that the hypothesis of water coming from the navel of the Viṣṇu may be possible. His research indicated that water is able to come into the Mebon in many ways, because the Mebon walls are completely permeable (Royère, pers. Comm. November 2013). However, very high water levels would be required to create a pressure gradient sufficient to force water to climb a copper pipe to the statue’s navel, which we can be confident was always set above the highest water level.

Another hypothesis is that the Khmer used a siphon system to move the water through the sculpture of Viṣṇu. Theoretically, a siphon could have transported water from the central shaft through the navel of the Viṣṇu if a tube or pipe descended lower than the water level in the shaft beneath it; however, the abdomen of the statue is missing, leaving us no evidence of such an installation. Nevertheless as previously mentioned two fragments of copper tubing 2.5 mm in diameter are reported as having been found in the eastern pit. An analysis and digital reconstruction of the fragments of the sculpture show that the mid-section of the torso is missing, along with other defining features such as the diadem. It is therefore not possible to reach a conclusion with respect to water issuing from the sculpture. However the imagery of Viṣṇu. Anatasayin is aligned with water cosmology.

5.7. Epigraphy

An inscription in Sanskrit and Khmer (K. 922) was found in the West Mebon by Glaize in March to April of 1944 (Glaize, 1944). Glaize, who was concentrating at that time on the anastylosis of the south-eastern corner of the Mebon, stated:

It should be noted that the block of sandstone forming an upper crosspiece was a reused stone, an engraved inscription line which is intersected by the groove. According to Mr. Coedès, this is a fragment of Pre-Angkorian text, probably from the seventh century, making mention of a deceased king and god Campeçvara, one of the great gods of ancient Cambodia found on inscriptions of Prasat Kok Po, in the same region of the Baray.

[(Glaize, 1944: 13)]

The many lacunae in this inscription make it hard to decipher. Jenner dated the inscription to 578–777 CE (Jenner, K.922 SEAlang online). The difficulty in deciphering the inscription is increased by the inscription having been carved on a piece of stone that has since been re-used. According to Glaize, the upper part of the stone had been scooped out in the middle to form part of a window. The inscription consists of seven lines, the first in Sanskrit and the rest in old Khmer, with the exception of one word in a pre-Angkorian script.

The inscription speaks of a person of nobility who is making an offering to the heavens (or it may read 'I who am about to die make this gift'). The gift is to Śrī Cāmpēśvara – a Khmer form of the god Viṣṇu who appears in many inscriptions, particularly in the 8th century. The last line of the inscription appears to establish the lineage of the donor (Coedès indicated that this was a royal donation). Claude Jacques states that it is of great interest that this inscription nominates Campeśvara (Viṣṇu) in the pre-Angkorian period. There is only one other known example with a dedication to Campeśvara – in K. 428, dated to 761 CE (Claude Jacques, pers. Comm., May 2014).

Coedès notes that in line number (2), the phrase '...añ ta dau svaryyāgata...' must mean the posthumous name of a ruler, and that the name '...ñ añ śrī campeśvara kñuṃ...' refers to one of the buildings of Prasat Kok Po, which he believes establishes the date for this inscription.

Coedès stated that the stone may have come from the 'Ville du Baray Occidental' – 'The place that they called the "Village of the West Baray"' (Coedès, 1954: 71). When the West Baray was constructed, a number of pre-Angkorian temples located at the western end of the *baray* were destroyed or disassembled, and many lintels and stones have been found on the bed of the *baray*. Jenner notes that there is an Angkorian form of the word 'Jaṃvon', whereas the word 'Jamnon' would be expected if the inscription were pre-Angkorian. The word Jaṃvon means 'the act of offering up' (Coedès, 1954: 71; Jenner, 2009: 122).

The EFEO *Report of Works* does not tell of its position on discovery, nor was the inscription photographed in situ. Therefore, it is impossible to tell whether it was part of the construction of the West Mebon at all. The inscription has now gone missing; some *estampages* do exist but are not available at this time.

6. Discussion

The posthumous name for Sūryavarman II was *Paramaviṣṇuloka*, which means, he who has gone to the paradise of the supreme Viṣṇu. Scholars have looked for but did not find a *baray* of Sūryavarman II, which they expected. One hypothesis is that he emulated his predecessor, Rājendravarman II, and restored and reclaimed, an existing *baray*. The Khmer kings often made reference to and emulated the kings of their past. Sūryavarman II had two *baray* that he could potentially have resumed, one to the east and one to the west. Sūryavarman II placed his temple mountain in the centre of Angkor, emblematically, he took control of the Angkorian landscape and infrastructure and hydraulic network by positioning his temple at the median point of the city. Symbolically the placement is at the junction of channels from the two great *baray* of his famous predecessors, Yaśovarman I and Sūryavarman I. The positions of Angkor Wat style temples (including Phimai, Phnom Rung, Muang Tam, Beng Melea, Chau Sey Tevoda, Banteay Chhmar, Wat Phu and Preaḥ Vihear), which stretch out across the empire, indicate a comprehensive resumption of the social and economic landscape. Along the southern side of central Angkor a pattern emerges between the sites of Chau Srei Vibol and possibly Banteay Srah, although the latter is particularly difficult to date because it is bare of ornament (Christophe Pottier, pers. Comm., October 2014). These factors give a context in which to understand the possible reasons for locating a massive gilded bronze sculpture of Viṣṇu in the act of creating the universe in the West Baray.

In the Khmer Empire, water played an essential part in the 'theatre of state', as well as in the functioning of the urban settlement and its vast components. The kings of Angkor, from Yaśovarman I onwards, made grand statements of territorial control. Often, these were combined with the establishment of inscriptions and the installation of images of deities on the temple islands created in the *baray*, known as *mebon*. The kings' vision was that these statements created certitude (in the minds of the populace) about the king's control over sovereign territories, and established power within central Angkor. Elaborate ceremonies presided over by the kings and their advisers would have played a

part in these events. The hydraulic systems, linked with the *baray*, created not only a water control mechanism but also a spiritual hub between incoming and outgoing water. This gathering together of the powerful forces of nature and the heavens through meritorious public works seems to have been a clear objective of the kings of the Khmer Empire.

The hydraulic system of Angkor was constantly in flux. The Khmer diverted whole rivers to fulfil their needs and ideals for the landscape. It seems that the operation and the symbolism of the hydraulic system of Angkor necessitated constant revision and restoration. The duty of the king was to ensure the supply of water to the large urban population that had developed at Angkor by the end of the 11th century. The god most associated with water and the creation of the universe is Viṣṇu. In the last quarter of the 11th and into the 12th centuries, and especially with the rise of the Mahīdharapura Dynasty, the cult of Viṣṇu Anantaśāyin became popular in Angkor.

The evidence of this 12th century popularity in Angkor is seen in the high prevalence of depictions of Viṣṇu Anantaśāyin at the source of water on the Kulen Plateau, the massive bronze Viṣṇu Anantaśāyin of the West Mebon, the West Mebon Stele which includes Viṣṇu Anantaśāyin on a Reachisey and the similar iconography seen in the sculpture from the *Terrasse Bouddhique*. The emplacement of that great statue may therefore be part of a trend towards representing the control of water by the rulers of that time. The position of the sculpture was probably well known by the general population, as attested to by its (probable) reference by Zhou Daguan.

7. Conclusions

The archaeology of the West Mebon indicates it had at least two installations of different deities at its centre. Although the walls, lintels and some of the objects indicate the initial construction and use of the West Mebon dates to the 11th century, other objects found within the West Mebon clearly date from the early 12th century.

The iconography of the West Mebon Viṣṇu clearly indicates it has a later date than was first proposed (Feneley, 2013). Another key piece of evidence is the stone *stèle* found in the West Mebon, which displays iconography datable to the early 12th century. Indicators that this depiction of Viṣṇu Anantaśāyin displays 12th century iconography include the *Reachisey* bed of Viṣṇu and an Angkor Wat style headdress of Lakṣmī. The iconography of the *stèle* is therefore aligned to Sūryavarman II. The other *stèle* found in the West Mebon depicting a Vaiṣṇava *trimūrti* may also be aligned to the early 12th century.

Since the purpose of a *stèle* is to record an official event or to mark sacred territory related to ritual activity, the implication is that it may indicate the date of the emplacement of the reclining West Mebon Viṣṇu. The *stèle* may also replicate the style and configuration of the statue. This would also fit with evidence from radiocarbon-dated sediment cores from the West Mebon that indicate the basin was cleaned out and restored in the 12th century, all of which suggests a major alteration to the shrine at that time.

Greater Angkor had a complex water network that was repeatedly remodelled, and the history of which is marked by a continual pattern of building, use, abandonment and re-use. The control of the hydraulic system of Angkor was paramount for the Khmer kings, both symbolically and economically. The *baray*, for example, were both functional water mechanisms and intensely ritualised locations.

To place an enormous gilded bronze Viṣṇu Anantaśāyin in the West Mebon, in the centre of the West Baray is a clear and purposeful statement since the West Baray was, and is, the largest human-made body of water in Angkor. The small shrine of the West Mebon was, then, an important spiritual site and possibly a *tīrtha* in its own right. A visualisation of pilgrims visiting the West Mebon was created, seen in Fig. 30. The source of water in the Kulen Hills, which feeds the hydraulic system of Angkor, was sanctified by depictions of Viṣṇu Anantaśāyin, Śiva *līngas* and representations of Brahmā. These carvings date from the 11th



Fig. 30. Visualisation 3 :The West Mebon Viṣṇu as a tīrtha.

century onward. The West Mebon Viṣṇu Anantaśāyin is consistent with this practise, and is so large and opulent was the sculpture and its ritual deposit that it must be a royal emplacement. Since Sūryavarman II was the only king in the Angkor Period who proclaimed Vaiṣṇavism as his state religion, there is a possibility that the West Mebon Viṣṇu may therefore have been part of his claim to political, ritual and economic dominance in Angkor.

We also know that Angkor Wat was a Vaiṣṇavite monument, and that its construction substantially reconfigured the landscape of central Angkor. It is possible, therefore, that the West Mebon Viṣṇu carries indications of an early 12th century date, and may have been associated with the construction program of Sūryavarman II. Fig. 31 will show a digital fly over the West Mebon and its Viṣṇu.

Supplementary data to this article can be found online at <http://dx.doi.org/10.1016/j.jasrep.2016.06.031>.

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References

Boisselier, J., 1966. *Le Cambodge (Tome I): Manuel d'Archéologie d'Extrême-Orient, Première Partie*. A. Pricard, J. Pricard, Paris.

- Chevance, J.-B., 2005. *L'Architecture et le Décor des Temples du Phnom Kulen Cambodge*. University Paris III Sorbonne, Doctor of Philosophy.
- Cœdès, G., 1935. *L'Origine Du Cycle des Douze Animaux au Cambodge*. T'oung Pao 31, 315–329.
- Cœdès, G., 1954. *Inscriptions du Cambodge: Collection de Textes et Documents sur l'Indochine*. V. EFEO, Paris.
- Cœdès, G., 1968. In: Vella, W.F. (Ed.), *The Indianized States of Southeast Asia*, English ed. The University Press Hawaii, Honolulu (Translated Susan Brown Cowing).
- Dagens, B., 1995. *An Indian Treatise on Housing Architecture and Iconography*. Sitram Bhartiya, Institute of Science and Research, New Delhi (trans. Mayamata).
- Daguan, Z., 2007 [1296]. *A Record of Cambodia: The Land and Its People* (Trans. by P. Harris) Silkworm Books, Bangkok.
- Day, M., 2012. *Paleoenvironmental history of the West Baray, Angkor (Cambodia)*. PNAS 109 (4), 1046–1051.
- Dumarçay, J., 1982. *Notes 'Architecture Javanaise et Khmère*. BEFEO 71, 87–146.
- Dumarçay, J., 1997. *Khmer Hydraulics*. In: Ibbitson Jessup, H., Zéphir, T. (Eds.), *Sculpture of Angkor and Ancient Cambodia: Millennium of Glory*. Washington, National Gallery of Art.
- Dumarçay, J., 2003 [1998]. *Architecture and its Models in South-East Asia*. Orchid Press, Bangkok.
- Dumarçay, J., Smithies, M., 1998. *The Site of Angkor*. Oxford University Press, New York.
- Evans, D.H., et al., 2013. *Uncovering Archaeological Landscapes at Angkor using Lidar* PNAS.
- Feneley, M., 2013. *The context of the West Mebon Viṣṇu*. In: Klokke, M.J., Degroot, V. (Eds.), *Materializing Southeast Asia's Past – Selected Papers From the 12th International Conference of the European Association of Southeast Asian Archaeologists*. 2, pp. 140–155.
- Feneley, M., 2015. *The West Mebon Visnu: style hydraulics and political power*. PhD University of Sydney.
- Fletcher, R., Penny, D., Pottier, C., et al., 2005. *Greater Angkor Project 2002–2005, Report West Mebon 2005*. University of Sydney.
- Fletcher, R., Penny, D., Evans, D., Pottier, C., Barbetti, M., Kumm, M., Lustig, T., 2008. *The water management network of Angkor, Cambodia*. *Antiquity* 82 (317), 658–670.
- Fletcher, R., Pottier, C., 2002. *The Gossamer City – a New Enquiry*. *Mus. Int.* 54, 23–27.
- Fletcher, R.J., Barbetti, M., Evans, D., Than, H., Sorithy, I., Chan, K., Penny, D., Pottier, C., Somaneath, T., 2003. *Redefining Angkor: structure and environment in the largest, low density urban complex of the pre-industrial world*. *Udaya* 4, 107–121.
- Glaize, M., 1936. *Rapport sur les Travaux Executes dans le Groupe D'Angkor* (Unpublished) EFEO.
- Glaize, M., 1940–1944. *Rapport sur les Travaux Executes dans le Groupe D'Angkor* (Unpublished) EFEO.
- Glaize, M., 1993. *Les Monuments du Groupe d'Angkor*. J. Maisonneuve, Paris.
- Glaize, M., 2005 [1957]. *Les Monuments du Groupe D'Angkor Présentés par Maurice Glaize*. J. Maisonneuve, Paris.
- Groslier, B.P., 2008 [1979]. *The Angkorian Hydraulic City: Exploitation or Over Exploitation of the Soil?* (Trans. by T. Lustig and C. Pottier) 20(December). *Aséanie*, pp. 1–45.
- Jacques, C., 2003. *Ancient Angkor*. River Books, Bangkok.
- Jacques, C., Dumont, R., 1999. *Angkor*. Könemann, Cologne, Germany.
- Jacques, C., Lafond, P., 2007. *The Khmer Empire: Cities and Sanctuaries, Fifth to Thirteenth Century*. River Books, Bangkok, Thailand.
- Jenner, P.N., 2009. *A Dictionary of Angkorian Khmer*. Australian National University, Canberra.
- Kramrisch, S., 1981. *The Presence of Śiva*. Princeton University Press.

- Kummu, M., 2008. Water management in Angkor: human impacts on hydrology and sediment transportation. *J. Environ. Manag.* 90, 1413–1421.
- Lagisquet, J. (1936). in *Journal de Fouilles*. Unpublished, EFEO.
- Leroy, S., Hendrickson, M., et al., 2015. First Direct Dating for the Construction and Modification of the Baphuon Temple Mountain in Angkor, Cambodia. *PLoS One*<http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0141052>.
- Penny, D., Pottier, C., Kummu, M., Fletcher, R., Zoppi, U., Barbetti, M., Tous, S., 2005. Hydrological history of the West Baray, Angkor, revealed through palynological analysis of sediments from the West Mebon. *Bulletin de École Française d'Extrême-Orient* 92 (1), 497–521.
- Penny, D., Chevance, J., Tang, D., De Greef, S., 2014. The environmental impact of Cambodia's ancient city of Mahendraparvata (Phnom Kulen). *PLoS One* 9 (1), 1–9.
- Pottier, C., 1999. *Carte Archéologique de la Région d'Angkor*. Sorbonne Nouvelle Doctor of Philosophy, Zone Sud, Université de Paris III.
- Pottier, C., 2000. À la Recherche de Goloupura. *BEFEO* 87, 79–107.
- Rao, G.T.A., 1997 [1914]. *Elements of Hindu Iconography*. Motilal Banarsidass, New Delhi.
- Vickery, M., 2000. *A Beginner's Guide to Early Cambodian History* (Unpublished document).
- Vickery, M., 2001–2002. *A History of Cambodia* (Summary of Lectures, Royal University of Fine Art Phnom Penh, Faculty of Archaeology) (Phnom Penh).
- Woodward, H.J., 1997. *The Sacred Sculpture of Thailand*. River Books, Bangkok.