
EXPLORING ANCIENT RESIDENTIAL FORMS OF THE OC EO CULTURE IN SOUTHERN VIETNAM

INSIGHTS FROM RECENT ARCHAEOLOGICAL ADVANCEMENT

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ABSTRACT

This study aims to elucidate the characteristics of settlement patterns within the Oc Eo community by systematizing data from both ancient texts and archaeological findings, beginning in the early 20th century and focusing particularly on discoveries from the past decade. The findings suggest that, in the early phase of Oc Eo, stilt houses served as the primary residential form, alongside simple and relatively level clay embankments used as living platforms. These stilt houses exhibited diverse variations concerning size and architectural features. The research also explores evidence of foundation-building techniques for wooden architecture documented archaeologically for the first time in Oc Eo culture, along with the selection of locally available materials, highlighting the Oc Eo community's adaptability in addressing environmental challenges, such as subsidence in alluvial and flood-prone areas and limited access to stone resources. Furthermore, the discovery of large wooden structures with intricate carvings suggests the existence of elite residential zones within significant Oc Eo settlements, reflecting a hierarchically structured society of Funan.

KEYWORDS

Oc Eo, stilt house, wooden, embankment, settlement, Mekong Delta

INTRODUCTION TO THE OC EO CULTURE IN SOUTHERN VIETNAM

The Oc Eo [Óc Eo in Vietnamese], an archaeological culture located in present-day southern Vietnam, is recognized as the material manifestation of Funan, the ancient kingdom that flourished from

the first to the seventh century CE. Since the initial exploration conducted by foreign scholars in the late 19th century, extensive research has shed light on the spatial distribution of the Oc Eo culture, which encompasses most of the Mekong Delta region. These Oc Eo cultural sites are situated amidst diverse natural landscapes and ecological environments, ranging from the low-lying regions

of the Long Xuyen Quadrangle [Tứ giác Long Xuyên] and Dong Thap Muoi [Đồng Tháp Mười] to the coastal sandy areas, as well as the transitional zones between ancient alluvial plains in southeast Vietnam and newly formed alluvial plains in southwest Vietnam.

Scholars have reached a basic consensus and outlined the overarching developmental framework of the Oc Eo culture. The dating framework is based on a detailed review of the results of excavations, stratigraphic analyses, comparative studies, and absolute dating methods. The Oc Eo culture and its preceding and subsequent periods can be divided into five stages: (1) *Pre Oc Eo*, spanning from the 3rd century BCE to the 1st century CE; (2) *Early Oc Eo*, ranging from the 1st to the 3rd century CE; (3) *Typical Oc Eo*, covering the period from the 4th to the 7th century CE; (4) *Late Oc Eo*, extending from the 8th to the 10th century CE; and (5) *Post Oc Eo*, circa the 10th to 12th century CE (Bui et al. 2018: 611-613). Maguin (2009: 103-118) delineated the archeology of Funan into two distinct phases: an initial phase characterized by “Control of flood plains and urban development”, and a subsequent phase referred to as “Indianization”. The former epoch encompasses the establishment of irrigation systems, limited transportation networks, the emergence of port cities, and the inception of early trade relations with the pre-3rd century CE world within the constraints of the Long Xuyen Quadrilateral region; taken as a whole, these events mark the beginning of the Funan kingdom. Subsequently, the Indianization process, spanning from the 4th to the 5th century CE, denotes the commencement of the Funan empire’s ascendancy.

The economic trade of Oc Eo experienced significant development and actively participated in the East-West trading network from the early centuries of the Common Era. The port city of Oc Eo, in particular, played a crucial role as a prominent

economic and trade hub not only for the kingdom of Funan but also for the surrounding regions. This kingdom evolved into a significant nexus for cultural exchange and commerce, forging connections among three emerging Southeast Asian realms. The first of these regions extended from present-day Lower Myanmar through Funan, where the Mon-Khmer and Pyu civilizations were in their developmental stage. The second region sprawled northward along the Vietnamese coastline from Funan, encompassing the domain of the Champa civilization. Furthermore, Funan maintained diplomatic and commercial ties with a third region, extending its influence into the cultural orbit of the Java Sea, inhabited by Malay ethnic groups (Hall 1985: 66-67). This is substantiated by the discovery of “Oc Eo coins” at numerous archaeological sites in present-day Thailand, Myanmar, and the Malay Peninsula. Additionally, through interactions with traders from outside of Funan, Oc Eo established connections with China, India, and even the Mediterranean (Vo 2008). A maritime trade route was established, starting from river ports along the Ganges, extending along the Bay of Bengal coastline, passing through the Kra Isthmus, looping through the Gulf of Thailand, and finally reaching the Mekong Delta (Bui et al. 2018: 626).

PREVIOUS RESEARCH OF RESIDENTIAL TRACES OF ANCIENT OC EO INHABITANTS

Research on ancient settlements, in general, represents a significant gap in the field of prehistoric studies on the Southeast Asian continent. Most studies primarily focus on issues related to subsistence practices and burial contexts. There is currently a paucity of information concerning the living environment and specific evidence concerning

the dwellings and spatial utilization by prehistoric communities (Grono et al. 2022).

In the prehistoric era of southeastern Vietnam, the traditional form of stilt-house settlements, is known to have emerged approximately 3,500 years ago. Archaeological investigations have revealed abundant traces of this residential form across numerous sites, aligning with the process of expanding residential areas by ancient communities, moving from the ancient high alluvia region to the lowland alluvial plains (Bui et al. 2017). Concentrations of residential sites are notably found in several regions: the brackish wetlands of Nhon Trach [Nhơn Trạch, Đồng Nai province] with sites such

as Cai Lang [Cái Lãng], Cai Van [Cái Vạn], and Rach La [Rạch Lã]; the ancient coastal lowland marshes of Ba Ria - Vung Tau [Bà Rịa - Vũng Tàu province], featuring clusters of sites like Bung Bac [Bung Bạc] and Bung Thom [Bung Thơm]; the ancient alluvial swamp areas of Tan Uyen [Tân Uyên, Bình Dương province] with the site of Phu Chanh [Phú Chánh]; and the low-lying riverine floodplain areas of Vam Co Tay River [Vàm Cỏ Tây, Long An province] with the site of Rach Rung [Rạch Rừng] (Bui and Pham 1986; Bui 2002; Bui et al. 2017; Pham 1996; Trinh et al. 2001; Trinh et al. 2002; Vuong 1991; Vu et al. 2002) (Fig. 1).

Meanwhile, the form of settlement on raised

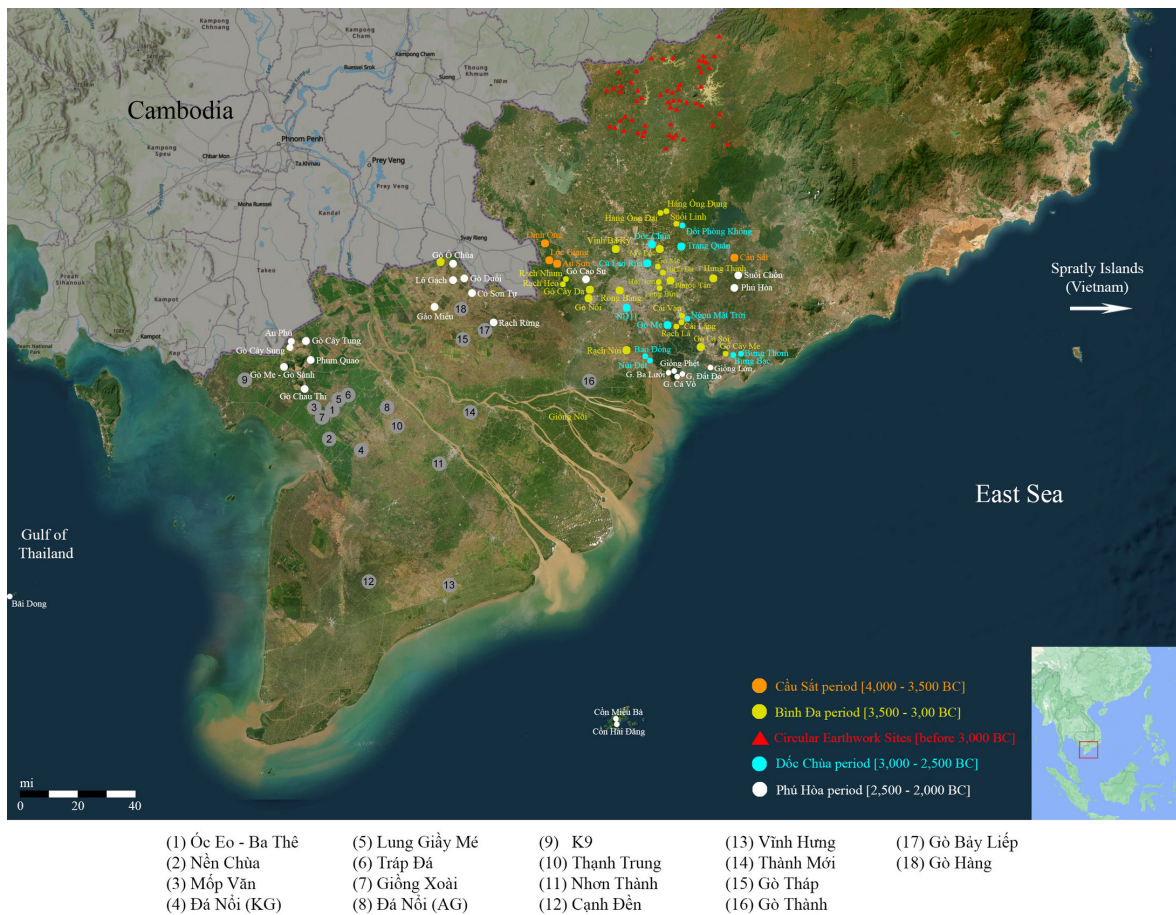


Fig. 1. Map showing the distribution of prehistoric sites in southern Vietnam and the residential traces of Oc Eo inhabitants discussed in the article (Basemap: OpenTopography [<https://portal.opentopography.org/datasets/>]; Referenced personal maps by Nguyen Quoc Manh and Nguyen Nhat Phuong).

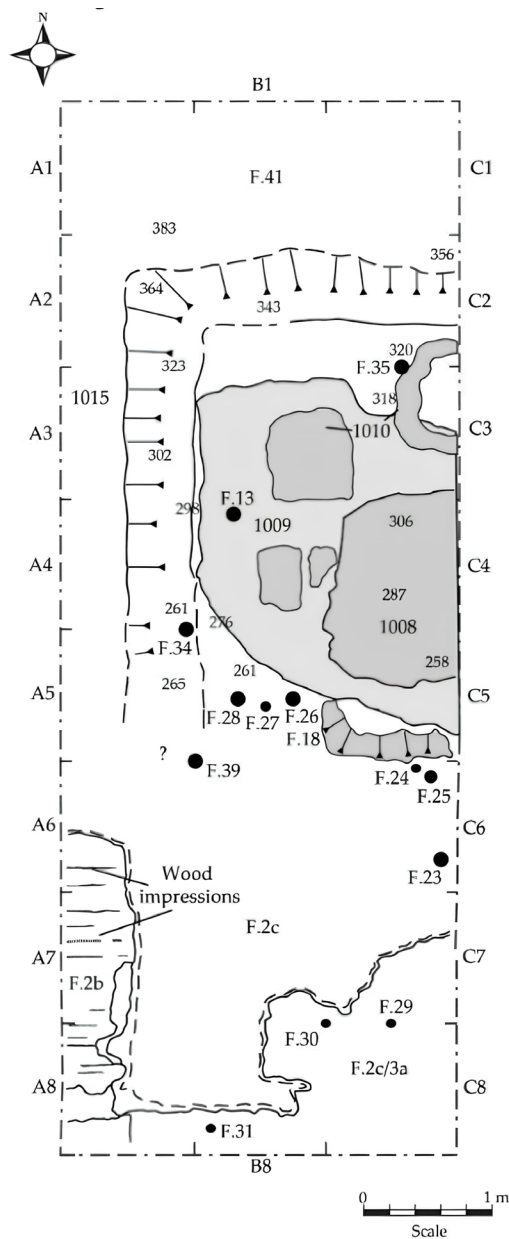


Fig. 2. The traces of postholes and earthen embankments at Rach Nui prehistoric site (© Center for Archaeology, Southern Institute of Social Sciences).

embankments has only been extensively recorded by archaeologists in sites situated along the Vam Co River, such as Rach Nui [Rạch Núi], An Son [An Sơn], Loc Giang [Lộc Giang], and Lo Gach [Lò Gạch], within the present-day boundaries of Long An province (Bellwood et al. 2011; Bui et al.

2017; Grono et al. 2022; Piper and Oxenham 2014; Nishimura and Nguyen 2002). These areas are characterized by naturally low-lying and relatively flat conditions. Archaeological sites are often located on elevated mounds approximately 3-5 m higher than the surrounding landscape. These mounds were formed through the long-term habitation of ancient residents, with house platforms solidified to create dry surfaces conducive to settlement. These platforms were continuously reinforced and repaired over time. A typical case is the Rach Nui archaeological site, in a cultural layer nearly 5 m thick, archaeologists discovered clear evidence of an ancient settlement, with distinct traces of at least 13 raised embankments in the early phase and 15 in the later phase, each layer averaging 10-15 cm in thickness (Fig. 2). Research has shown that ancient inhabitants purposefully selected settlement locations and the settlement process occurred almost continuously for more than 200 years, with periodic rebuilding and reinforcement of house platforms occurring every 10-15 years or more frequently (Le 2023: 55-66). Additionally, there are differences between the early and late settlement phases. In the early phase, embankments were relatively simple and constructed from compacted clay, combined with traces of charcoal on the surfaces indicating the use of fire for cleaning and surface reinforcement. In the later phase, these embankments tended to be more expansive in scale, constructed with clay mixed with a higher proportion of charcoal, small pottery fragments, and calcium carbonate components derived from shell fragments to enhance bonding. These were subjected to thermal firing, accompanied by less distinct traces of the use of wooden structures in house construction (Bui et al. 2015).

It is evident that, in order to coexist with the challenging peat swamp and brackish wetland environment of southern Vietnam, the choice of hab-

itation on elevated mounds, the construction of embankments, and dwelling in stilt houses were common and adaptive practices by the ancient residents.

The traces of stilt-house posts left within archaeological sites are abundant; however, under the objective conditions of excavation and research, especially within limited excavation areas, recreating an entire living space for the entire region or studying the structure of this type of stilt house is exceedingly challenging (Bui et al. 2017: 402). Nevertheless, archaeology has provided important pieces of evidence regarding this form of habitation. In addition to the footprint of the foundation posts, numerous wooden columns, beams, and timber pieces placed horizontally or vertically, intimately related to the process of stilt-house construction and the architectural framework of the houses, have been discovered in most excavation trenches at Cai Lang [Cái Lãng], Cai Van [Cái Vạn], and Rach La [Rạch Lá]. These tangible pieces of evidence demonstrate the widespread use of wood in constructing the frames or roof structures of the houses of that era (Nguyen et al. 2004). Roof coverings could have been made from branches and leaves of water coconut palm, a readily available and durable material commonly found in the brackish wetland region. This material has been acknowledged as one that ancient people used for roofing their houses. It has also been discovered at the Rach Nui and the Phu Chanh archaeological sites (Bui et al. 2017).

Meanwhile, at Bung Thom, a type of low stilt house with small platforms supported by short posts and doorways typically facing east, is evident. Artifacts discovered in the cultural layer are concentrated in clusters, associated with the floor imprints, indicating that the predominant productive activities of the Bung Thom inhabitants were carried out within the residential premises (Bui et al. 2017; Vu and Ho 1998, 1999). These findings

contribute to proving the advancement of house construction techniques and the skilled use of wood as a material by the ancient community. This is supported by the collection of artifacts crafted from the same material, such as boats, paddles, loom frames, etc. (Ha 1999; Pham 1996). It can be posited that the tradition of constructing stilt houses on embankments, an adaptive and harmonious response to the environmental conditions of the delta region in southern Vietnam during prehistoric times, was likely inherited by the people of the ancient Oc Eo culture in the first millennium CE.

Initial Discoveries of Residential Evidence of Ancient Oc Eo Inhabitants

The earliest recorded observations of the traces of residences of Oc Eo culture inhabitants date back to 1931, made by two French scholars, Herry Parmentier and Jean-Yves Claeys, at the Go Thap [Gò Tháp] archaeological site. During their excavation of the Ba Chua Xu [Bà Chúa Xứ] temple area, they unearthed numerous traces of ancient architecture, including wooden stilt house posts, stone architectural elements, and brick floors (Bui et al. 2018: 128). In 1944, during the excavation in the Oc Eo paddy field located in the Long Xuyen Quadrangle area, Louis Malleret and his team uncovered traces of wooden architectural structures, including stilt house piles, at some locations such as Go Oc Eo [Gò Ốc Eo], Go Cay Trom [Gò Cây Trôm], the banks of Lung Lon [Lung Lớn] canal and Go Giong Cat [Gò Giồng Cát], alongside religious structures made of brick and stone (Malleret 1959: 299-337).

After 1975, Vietnamese archaeologists continued the research efforts on Oc Eo culture in general and made initial records specifically regarding the types of residential sites (Fig. 1). The research results indicate that within the Oc Eo culture, there were two forms of residential sites, common-

ly found in various natural conditions across the Mekong Delta region: stilt house architecture and earthen embankment¹⁾, with some cases of a combination of both.

Long Xuyen Quadrangle Region

During the excavation of the Nen Chua [Nền Chùa] site in 1983, the structural features of residences on stilt house were recorded, including 11 upright wooden columns and horizontal wooden bars at a depth of 0.5-1 m below the ground surface, along with traces of stilt house posts along the waterways of the site (Duong and Vo 1984: 178; Le 1983; Le et al. 1995: 156). In the Oc Eo fields during the 1983 fieldwork season, at Go Oc Eo and Go Cay Da [Gò Cây Đa], archaeologists discovered numerous wooden posts alongside many ancient pottery fragments in the cultural layer (Le et al. 1995: 193). As part of the Vietnam-France Collaborative Research Project, Archaeology of the Mekong Delta, conducted from 1998 to 2002, archaeologists identified continuous traces of habitation featuring stilt houses and tile-roofed structures. These traces span from the early period (1st-3rd centuries CE) to the typical Oc Eo period (4th-7th centuries CE). These structures were found in elevated, non-flooded areas within the Oc Eo lowland

as well as at the border between the lowland and the foothill region of Ba The Mountain, adjacent to the floodplain (Manguin 2002: 22). At the Go Giong Cat site, traces of wooden posts were identified deep beneath the muddy soil layer, along with an ancient well structure with a circular brick upper portion and a square wooden frame underneath (Bui et al. 2018: 59). The Giong Xoai [Giồng Xoài] site also revealed four intricately carved wooden blocks in the form of Makara heads, possibly column heads or decorative elements originally above the doorframes of a large wooden structure (Fig. 3) (Vo 2001: 771-775).

Furthermore, at various other monuments in the Long Xuyen Quadrangle region such as Go De [Gò Đé], Lung Giay Me [Lung Giày Mé], Trap Da [Tráp Đá], Da Noi [Đá Nôi] in An Giang; Mop Van [Móp Vãn], Da Noi [Đá Nôi], K9 in Kien Giang [Kiên Giang], in addition to religious architectural remains, archaeologists have also noted the presence of settlement phases with numerous postholes and wooden posts appearing in high concentrations, associated with scattered distributions of domestic pottery fragments (Bui et al. 2018: 31; Dao 1995; Le et al. 1995: 48, 50; Nguyen and Dao 2007; Vo 2001).



Fig. 3. Decorated wooden blocks found at Giong Xoai site.

Dong Thap Muoi [Đồng Tháp Mười] Region

Alongside the earliest documentation by Parmentier and Clayes in the early 20th century, Vietnamese archaeologists also uncovered evidence of habitation areas at numerous locations within the Go Thap archaeological complex in the 1980s and 1990s. These included Dia Phat [Địa Phật] and Dia Vang [Địa Vàng] sites with rows of wooden posts (Dao 1995: 49); Go Minh Su [Gò Minh Sù] with two phases of residences on stilts and residences on clay embankments with numerous traces of wooden posts around them, alongside religious architecture in the later phase (Dao 2010: 26). Notably, there was a discovery at Go Thap Muoi [Gò Tháp Mười] where the foundation beneath the brick and stone architecture consisted of three layers of round timber, with an average diameter of 20-30 cm, comprising 12 stacked logs. Two layers were stacked parallel to the north-south direction, each consisting of five logs, and the middle layer had two logs arranged in an east-west direction (Dao and Vo 2004: 309-310).

Furthermore, in Long An province, at the Go Hang [Gò Hàng] site, a large-scale settlement-workshop area with numerous traces of stilt house wooden posts and wooden artifacts was documented through survey and reconnaissance (Nguyễn and Bui 1989). The Go Bay Liep [Gò Bảy Liếp] site also recorded traces of deep wooden posts, exhibiting similar characteristics to the type of wooden posts commonly found in the Oc Eo culture (Bui et al. 2002: 167).

U Minh - Canh Den [Cạnh Đền] Region

Within the layer of residential culture at a depth of 1.23 m below the ground surface at the Canh Den archaeological site, archaeologists discovered numerous stilt house wooden posts associated with pottery fragments, charcoals, and animal bones during a survey in 1986 (Le et al. 1995: 54). Ad-

ditionally, at the Vinh Hung [Vĩnh Hưng] temple, also known as the Tra Long [Trà Long], which was initially discovered in the early 20th century and later surveyed in 1990, excavations conducted in 2002 and 2011, also documented the presence of several wooden posts in the residential area, along with postholes in front of the temple structure (Bui 2011: 15, 19, 24; Nguyen 1990).

O Mon [Ô Môn] - Phung Hiep [Phụng Hiệp] Region

The Nhon Thanh [Nhơn Thành] archaeological site, discovered in 1990, yielded traces of stilt house architecture within the cultural layer, characterized by an array of upright wooden posts arranged in two groups with different diam: a smaller group with diam ranging from 8-10 cm and a larger group with an average diameter of 12-16 cm. Alongside these findings were various artifacts related to the structural components of stilt houses, including a wooden staircase with engraved patterns, a part of dugout boat and decorative wooden columns (Fig. 4). Research conducted through five excavation phases at the site clarified the spatial distribution of a “riverine urban center” covering approximately 56 ha, characterized by the image

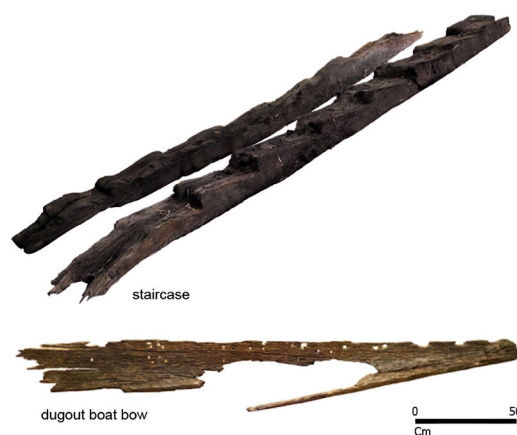


Fig. 4. Wooden artifacts discovered at the Nhon Thanh site (Bui et al. 2019: 174).

of “above the pier, and below the boats”, and the formation of stilt house clusters along a network of canals and waterways. Furthermore, the ancient inhabitants of Nhon Thanh modified their living space by reinforcing it with clay to create elevated and expansive embankments, upon which they constructed their stilt houses. Radiocarbon dating, combined with typological comparisons, suggested that Nhon Thanh residential area may have been formed during the Oc Eo development period, from the 4th century to circa the 7th century CE (Bui et al. 2018: 179-181; Bui et al. 2019: 82-88; Nguyen and Nguyen 1995: 7-16; Nguyen 2023; Nishimura 2004, 2005).

Additionally, traces of stilt house residences have also been recorded at the archaeological sites of Thanh Trung [Thanh Trung] in Can Tho city [Cần Thơ] and Thanh Moi [Thành Mới] in Vinh Long province [Vĩnh Long] (Bui et al. 2018: 104-105).

Coastal Sand Mound and Dune Regions

Traces of residence related to the ancient community of the Oc Eo culture have been discovered in the lowland areas of the Go Thanh [Gò Thành] archaeological site, within a cultural layer at a depth from 1.5 to 3 m below the modern surface. Here, elements of stilt house architecture were uncovered, comprising several processed wooden bars and a layer of leaves of water coconut approximately 0.3 m thick, which likely served as roofing or wall materials. These findings were associated with other artifacts, including pottery fragments, buffalo and cattle bones, fish bones, and charcoal (Le et al. 1995: 160).

Summary of Previous Research Findings and Outstanding Issues

Vo Si Khai [Võ Sĩ Khải] (2008: 52-54), in his

article summarizing 60 years of research on the Oc Eo culture, presented at the scientific conference Oc Eo Culture and the Kingdom of Funan held in 2004, noted that the discovery of wooden structural components at Giong Xoai, including a detached column head with a stand, measuring 87.5 cm in length, 23 cm in height, and 31 cm in thickness. Furthermore, a remaining column segment measuring 2.45 m in length with a diameter of up to 40 cm made from resinous wood which was excavated in 2001 at Go Oc Eo, provided a relative concept of the size of wooden houses in this urban area. It was also noted that in the Oc Eo fields, residents lived in stilt houses and boats. Small houses were primarily constructed with round posts, sometimes with octagonal sides, assembled with dowels and pegs. In Canh Den, rectangular or square-shaped columns were discovered with widths of up to 40 cm. Some structural elements featured rounded edges or decorative motifs. The majority of the wood used for building houses belongs to the *Dipterocarpus* genus within the Dipterocarpaceae family, such as, Merawan [kiền kiền], Golden oak [sao], Rosewood [traí], Meranti [cà chặc], and Fragrant rosewood [giáng hương].

The earliest information, though still quite rudimentary, along with evidence related to the settlement elements of the ancient Oc Eo community, has been documented by ancient texts and archaeologists, with the most prominent feature being their prevalence, primarily the traces of stilt house wooden posts. These are spatially and temporally related to religious architecture, concentrated in the low-lying floodplain areas or inundated regions. This partly reflects the flexible adaptation of the ancient residents to their environmental conditions. Simultaneously, these environments were conducive to preserving and conserving organic materials that would otherwise have deteriorated. However, due to various objective limitations such as excava-

tion area constraints and the inability to identify the characteristics of clay embankments, or the central focus of this research phase which was religious architecture, most findings are isolated phenomena. As a result, the full scale, original structure, or specific characteristics of settlement sites have yet to be clearly identified.

SIGNIFICANT DISCOVERIES REGARDING ANCIENT OC EO RESIDENTIAL FORMS IN THE PAST DECADE

Previously, the primary focus of archaeological research on the Oc Eo culture was on various religious architectural relics and their associated artifacts. Over the past two decades, attention and research investment have gradually shifted toward the residential sites and the material and spiritual aspects of the Oc Eo ancient community. Most recently, within the framework of the State-funded research project “Research on the Archaeological Complex of Oc Eo - Ba The and Nen Chua (Oc Eo Culture in Southern Vietnam)”, conducted by the Vietnam Academy of Social Sciences from 2017 to 2020, archaeologists have uncovered traces of residential areas, including stilt houses and constructed clay embankments, in addition to large-scale religious structures. These findings have provided valuable new information for investigating and researching ancient residential forms as well as settlements in general.

New Discoveries at the Oc Eo - Ba The Archaeological Complex (An Giang Province)

Researchers considered the Oc Eo - Ba The archaeological complex to be one of the most sig-

nificant economic, cultural, and trading centers of the Funan kingdom. It included a port city covering approximately 450 ha within the Oc Eo paddy field, as well as architectural monuments densely distributed on the slopes and foothills of Ba The mountain (Bui et al. 2018; Bui et al. 2022). In this area, archaeologists have uncovered clear traces of ancient settlements along the Lung Lon canal, Go Giong Cat, and Go Giong Trom archaeological sites located in the Oc Eo paddy field.

Traces of Stilt Houses along Lung Lon Canal

Lung Lon, also known as Lung Gieng Da [Lung Giếng Đá], was the name of an ancient canal that likely connected the Angkor Borei archaeological site in the north, passed through the ancient city of Oc Eo, and extended southward to the gateway port of Ta Keo (also known as Nen Chua) (Malleret 1959: planches Pl. XII). Lung Lon was identified by Malleret as comprising two canals, which he numbered 4 and 16 (Fig. 5). This canal section, designated as canal number 16 by Malleret, followed a northeast-southwest direction. Scientists acknowledge the significant role of the ancient Lung Lon canal and the network of connections with natural waterways and man-made canals in the formation and development of the Oc Eo city in particular, and the Funan kingdom in general (Bui et al 2022: 150). This ancient canal is still discernible through photographs taken by the French in 1928 and 1953. However, due to decades of local agricultural land leveling activities for rice cultivation, it is nearly impossible to identify its physical presence today. The excavation of the Lung Lon canal within the scope of the aforementioned research project is located within the boundaries of the ancient city of Oc Eo.

The 2017-2020 excavation results revealed traces of residential activity along the ancient canal, including postholes, wooden posts, columns,

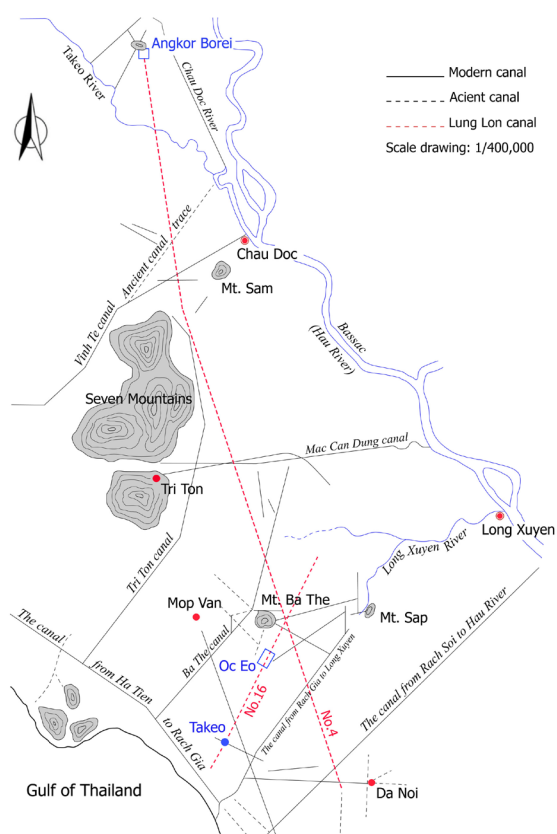


Fig. 5. Lung Lon and ancient canal systems of Oc Eo culture in the western Hau River region (after Malleret 1959: Pl. XII, omitting the numbering for other ancient canals).

and other architectural structures. These features are primarily evident in the cultural layer associated with the Oc Eo period, dating from the 2nd to the 5th century CE, which corresponds to the main operational period of Lung Lon (Le 2020). In section A (approximately 50 m east of Go Oc Eo), excavation trench H4 revealed numerous small wooden posts, with diameter ranging from 10-15 cm. These posts were unevenly distributed but featured pointed ends and were driven into the ground, indicating the likelihood that this area served as a residential site with stilt houses along the canal's bank (Fig. 6). Meanwhile, excavation trench H7, situated on the west bank of the canal, beneath a layer of pottery



Fig. 6. Wooden posts and postholes traces at section A, Lung Lon canal.



Fig. 7. The traces of stilt houses at section B, Lung Lon canal.

approximately 20 cm thick, revealed five irregularly arranged wooden posts. These posts had an average diameter ranging from 10-15 cm, with one post being rectangular and adjacent to a round-shaped wooden post. This may represent another part of the water-edge stilt house structure used by the Oc Eo inhabitants (Le 2020).

However, the majority of traces of wooden columns and posts were discovered in section B, with approximately 70 wooden posts and postholes. A common characteristic is that they are either located directly on the ground surface or buried and driven deep into the natural layer. Specifically, in trench H1, four large wooden columns were dis-

covered, with diam ranging from 20-25 cm and an average length of 2 m. These columns featured one pointed end and were driven deep into the bottom of the canal, reaching depths of 1.4-1.7 m; among them were two closely spaced buried posts (2 m apart) and two columns spaced farther apart (4 m). These may represent traces of stilt-house structures. Trench H2 revealed the remains of a collapsed stilt house structure at a depth of 2-2.2 m relative to the canal bank. Only three wooden columns, averaging 1.3-1.5 m in length and with an average diameter of 15 cm, were left, with one column having pointed ends on both sides and two columns with flat ends (Fig. 7).

Notably, in the adjacent trenches H3 and H4, archaeologists recorded 33 wooden posts and columns arranged along the boundary between the canal bank and the water's edge in a relatively straight north-south orientation, with an average spacing of 1.5 m between them. These wooden columns had diam ranging from 10-15 cm, with their upper ends facing toward the center of the canal penetrating the clay sediment layer to depths of 1.7-2 m. They were sturdy and might have served as mooring points for boats or reinforcement columns along the canal bank. In particular, in the boundary area between the canal bank and the canal bed, a group of wooden posts with varying diam was exposed. This group included five large wooden columns with an average diameter of 15 cm, ranging from 1.3-1.5 m in length, with the longest column measuring approximately 2 m. Among them, two columns had notches at both ends, one had a 'mortise' hole, and the remaining columns had pointed ends at one end. Smaller wooden posts, approximately 5 cm in diameter and less than 1 meter in length, were interspersed among the larger columns. Archaeologists suggest that these could be components of a small-scale water-edge stilt house that had collapsed in place (Le 2020).

Traces of Embankments and Wooden Structures at the Go Giong Cat Site

The Go Giong Cat archaeological site is located to the north within the ancient city space of Oc Eo and on the western bank of the Lung Lon canal. In the early 1980s, archaeologists from the Center for Archaeology, Southern Institute of Social Sciences, conducted a survey and documented this site's condition, revealing that it still retained its dimensions of 50 x 45 m, rising about approximately 5 m higher than the surrounding paddy fields (Le 1983). Its surface was covered with overgrown bushes and wild plants, and in some areas, had been converted into a fruit garden. However, due to large-scale illegal excavations for precious items and gold, the original landscape and almost all architectural remnants documented by Malleret during the 1942-1944 period (Malleret 1959: 377-392) were completely altered and destroyed. Excavations at the Go Giong Cat site, divided into two adjacent areas designated as section A and B, conducted from 2018 to 2020, revealed traces of numerous wooden structures arranged in a regular pattern, along with a series of postholes, wooden posts, and columns. These findings, in addition to the large-scale religious architectural remnants from the later phase, provide new and profound insights into the formation, development, and characteristics of the site (Nguyen 2020).

In section A, covering an area of nearly 3,000 m², excavations were conducted in 6 trenches by the author of this article and his colleagues, all of which revealed the presence of variously sized, tightly packed clay embankments, devoid of artifacts and nearly the same elevation. Beneath these embankments were black vegetal-rich soil layer, and at the lowest level, a greyish-green clayey sediment layer was found. The clay embankments likely represented the residential spaces of the ancient community, often associated with house structures

also found at the site, and could serve as foundations or stabilization for the structures above. Most notably, in excavation trench H1, archaeologists have discerned the presence of four clay embankments, along with two stilt house-like structures, which were established and developed in a continuous process, dating back as early as the 2nd century CE and ending until approximately the 4th century CE, set within the context of the cultural progression and the corresponding artifacts found. Additionally, unique circular and square water well-like structures were discovered in trenches H3 and H4, which were a combination of brick structures above and wooden frames below, and can be used to serve the daily and religious activities of local residents (Nguyen 2020). Below are some representative examples of embankments and wooden structural features found in trench H1.

The Embankment OE.18.GGC.A.H1.NĐĐ01

At the earliest cultural layer of trench H1, there is evidence of a clay embankment made from pliable and tightly packed clay with a dark grayish-black color, designated as NĐĐ01. This embankment is devoid of artifacts and ranges in thickness from 27 to 48 cm, emerging at elevations ranging from +0.566 to +0.619 m relative to modern sea level. It directly overlies a layer of natural black vege-



Fig. 8. The embankments of NĐĐ01 and NĐĐ02, Go Giong Cat site.

tal-rich soil. Additionally, residual traces of wooden posts penetrate through the embankment into the natural soil layer (Fig. 8). The formation age of this clay embankment likely dates back to the earliest period in this area, circa the 2nd-3rd century CE, based on the nearby layers containing pottery of the early Oc Eo phase (Nguyen 2020: 82).

The Embankment OE.18.GGC.A.H1.NĐĐ02

The clay embankment, designated as NĐĐ02 and depicted in Fig. 7, was formed directly above the NĐĐ01 layer. It has a yellowish-brown color (10YR 5/6) and exhibits a tightly structured composition devoid of artifacts inside. This embankment emerges at an elevation of +0.994 m relative to modern sea level. It is thicker in the central part (over 30 cm) and gradually thins towards the eastern end (16.5 cm) and western end (20 cm). This suggests that the distribution of this embankment was seemingly intentionally limited to specific architectural features or individual habitation spaces rather than being widespread (Nguyen 2020: 82-83).

The Embankment OE.18.GGC.A.H1.NĐĐ03

The clay embankment NĐĐ03 has a pale yellowish-brown color (2.5Y 5/6), with a compact structure, emerging at an elevation ranging from +1 to +1.1 m relative to modern sea level (Fig. 11b). On top of it is a stone architectural ruin resembling an open-air religious temple. The embankment layer has an average thickness of 50-60 cm, with a relatively flat surface. The western edge slopes gently, while the eastern edge gradually thins and overlays a layer of black soil containing a significant amount of pottery. Based on the construction sequence and the correlation between earthen foundations and cultural deposits, it is evident that this foundation was built at the latest during the settlement period characterized by earthen foundations and wooden

architecture, dating to approximately the 4th-5th century (Nguyen 2020: 83-84).

The Postholes/Wooden Columns Cluster

Within the 36-square-meter area of test pit HKT4, archaeologists identified traces of 27 postholes accompanied by 8 dark soil pits, emerging at the surface of a light blackish vegetal-rich layer (7.5YR 3/1), approximately 15-20 cm thick, at an elevation ranging from +0.3 to +0.5 m relative to modern sea level (Fig. 9). Below this layer was a natural soil layer consisting of two parts: an upper layer of yellowish-gray soil (2.5Y 6/1) and a lower layer of light brown soil (7.5YR 5/6).

The postholes predominantly exhibited round or oval shapes and were irregularly distributed. This pattern implies the use of wood, likely for the construction of stilt houses, suggesting an extended period of habitation characterized by modifications and overlapping wooden structures. Furthermore, 27 postholes were excavated of varying diam: 12 had diam of less than 20 cm, commonly falling within the range of 10-15 cm; 9 had diam ranging from 20 to 30 cm; and 6 had larger diam ranging from 30 to 40 cm. The interior of these postholes typically contained clay soil mixed with a significant amount of sand, appearing brownish-gray and containing traces of charcoal and some pottery fragments. Intermixed with the posthole imprints were indistinct, amorphous dark soil pits characterized by a loose, friable structure, along with charcoal and pottery fragments inside. This area has been identified as part of the earliest living space of ancient inhabitants here, characterized by typical pottery types from the early Oc Eo period, dating approximately to the early 1st-3rd centuries CE (Nguyen 2020: 36-41, 121-122).

The Wooden Structure OE.18.GGC.A.H1.KT02

The surface of clay embankment NĐĐ02 re-



Fig. 9. The posthole traces at HKT4, Go Giong Cat site.



Fig. 10. The wooden structure KT02, Go Giong Cat site.

vealed traces of 33 postholes and 7 small wooden posts with diam ranging from 10 to 13 cm, with one end sharpened and driven directly through the embankment. Among these, a system of postholes and wooden posts can be identified, distributed in a regular pattern, comprising at least three rows aligned along a north-south axis, spaced approximately 1.3-1.4 m apart. Each row consists of at least four imprints of wooden columns or postholes in a straight line spaced an average of 1.6-1.7 m. Additionally, six dark soil streaks are distributed in an east-west direction, nearly alternating between the rows of posts (Fig. 10). Archaeologists suggest that these may be traces of a stilt house, dating to the latest period of habitation in this area, circa the 3rd-4th century CE, before the construction of large-scale religious structures (Nguyen 2020: 121).

The Wooden Structure OE.18.GGC.A.H1.KT03

The surface of the NĐĐ03 embankment records

the presence of 11 wooden columns and 16 postholes, distributed in a highly regular pattern, with no signs of remodeling or replacement (Fig. 11a, b). This could represent the remnants of a large-scale wooden architectural feature. Although limited by the space of the excavation trench, it is evident that this structure has a rectangular plan oriented east-west, measuring at least 7.26 x 6.3 m, and covering an area of approximately 45.7 m². The structure is divided into five rows of columns, bounded by the north wall of the excavation trench, with respective spacings of 1.4, 1.67, 1.8, and 1.3 m. Each row contains at least four imprints of wooden columns or postholes, with average spacings ranging from 1.45-1.5 m. At the western end of the two rows adjacent to the north wall, there are traces of paired postholes, spaced 50 cm apart and located about 2.3-2.4 m from the adjacent row of columns.

The columns were erected using a negative post or buried post technique, wherein ancient inhabitants dug holes through the clay embankment layer. The bases of the wooden columns were shaped like inverted U-shaped notches, measuring 10-16 cm in width, with a rectangular wooden “tenon” about 4 cm thick passing through (Fig. 11c). This technique likely served to enhance stability and prevent subsidence for the structure above. The dating analysis result, utilizing the AMS method from one of the wooden crossbars, indicates a date range of 125-

231 cal AD (95.45%).

Based on the construction sequence, correlations between clay embankments, and cultural accumulations in the vicinity, as well as AMS dating analysis results, this wooden structure could have been built as early as the 3rd century CE. It also represents the final habitation phase in this area before an open-air temple architecture was constructed and covered above (Nguyen 2020).

New Discoveries at the Nen Chua Archaeological Site (Kien Giang Province)

The Nen Chua site, also known by its original name Ta Keo, is the southernmost point of the Lung Lon canal, located about 12 km south of the Oc Eo - Ba The archaeological complex. It served as a gateway port, the commercial entrance to the ancient city of Oc Eo, as previously documented by Malleret (1959: 5-6, 105). Subsequently, Vietnamese archaeologists conducted the first excavations in the 1980s and undertaken multiple surveys afterward. The results unveiled the remaining portion of a large-scale rectangular religious architectural foundation, measuring 25.6 x 16.3 m, oriented in an east-west direction (with a slight deviation to the south by 10 degrees). In addition, archaeologists also identified evidence of ancient habitation with upright wooden columns and some horizontal



Fig. 11. The clay embankment NĐĐ03 and the architectural site KT03, section A, Go Giong Cat Site.

wooden bars distributed across a wide space, along with concentrated areas of pottery fragments clustered around water sources and favorable transportation locations (Le et al. 1995: 46-47).

This site underwent comprehensive excavation from 2018 to 2020, covering an area of over 8,000 m², divided into five sections labeled A, B, C, D, and G. The results revealed remnants of the foundation of a Hindu temple entirely constructed of stone, a water reservoir with a stone embankment, two rectangular-shaped sacred water wells are constructed in an inverted pyramid style, where one is built with stone, and the other is constructed with bricks (Bui et al. 2022). Simultaneously, archaeologists also recorded traces of an ancient residence located to the west of the Lung Lon canal, notably, ten traces of wooden architectural structures. These are divided into two distinct groups based on construction techniques: the first group used a simpler technique with pointed column heads that were sharpened and directly embedded into the ground, while the second group features more complex techniques with a system of columns with mortise joints passing through them and connecting with wooden beams below, as well as a system of wooden columns supported by beams (Lai and Le 2020: 44-48). The wood used for these structures is sourced locally from tree species, such as Acacia [tràm], Ceylon ironwood [đước], Golden oak [sao], and Golden penda [gáo].

The Group with the Simple Technique in Construction

The Structure NC18.B3.KT01

Distributed in section B3, this wooden structure exhibits an almost square plan oriented from northeast to southwest (north deviating to the east by 20 degrees), in a space measuring 6.6 x 6.45 m, approximately 42.57 m². It includes a total of

83 wooden posts, columns, and postholes, with 43 columns identified (Fig. 12). These columns are arranged in six rows with distances ranging from 1.5 to 2 m apart, with each row containing at least five columns spaced 1.5-1.8 m apart (Bui et al. 2022: 231). The majority of columns in this structure are single, but some locations exhibit clusters.

The Structure NC18.B3.KT02

The structure KT02, overlaps with a portion of the eastern side of the architectural structure KT01 (Fig. 12), has a rectangular plan and is in the same orientation as the surrounding structures, measuring 8.43 x 5.38 m, approximately 45.35 m² in area. A total of 31 wooden posts and columns are identified within the architectural space, with 18 columns arranged in six rows spaced 1.5-2 m apart, with each row containing up to four columns spaced 1.5-1.8 m apart (Bui et al. 2022: 231).

Observing the construction and reinforcement techniques in section B3 reveals that larger-diameter columns were typically made smooth on the surface, tapered at the lower end, and directly embedded into the ground. In contrast, smaller wooden posts were left in their natural state without processing. Additionally, clusters and single columns were identified in low-lying areas, suggesting their function in reinforcing or replacing damaged columns during use (Bui et al. 2022: 232-233). An interesting observation is the correlation between the location of the stilt house and the number of wooden columns used. In higher elevation areas, the structures had fewer columns, and vice versa. This contributes to evidence of adaptation to the environmental conditions by the ancient Oc Eo community in this region. Based on comparative analysis of pottery collections and stratigraphic changes, archaeologists have determined that the trace of the stilt houses along the edge of the ancient canal in Nen Chua area date from approximately the 1st-3rd

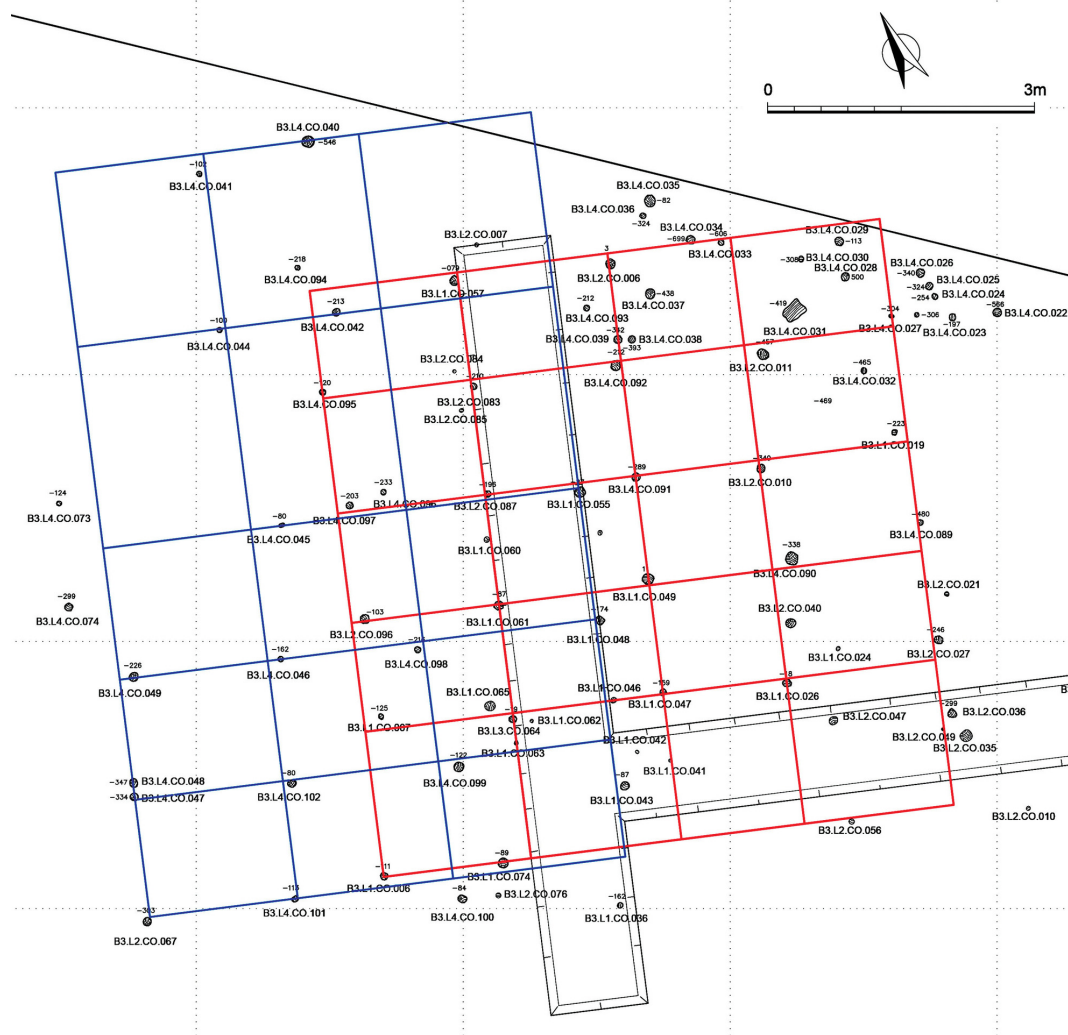


Fig. 12. The architectural traces of KT01 (in red) and KT02 (in blue), section B3, Nen Chua site (Bui et al. 2022: 232).

centuries CE and continued to exist for many centuries thereafter (Bui et al. 2022: 239).

The Structure NC18.G1.KT01

The structure, located in section G1, has a rectangular ground plan oriented north-south (with a north deviation to the east by 19 degrees) and measures 13.37 x 9.2 m, covering an area of approximately 123 m². It comprises 121 wooden posts and columns, with 61 columns identified, and distributed in a regular pattern. This includes six parallel rows spaced 1.5 m apart in the east-west direction and four irregular rows with the same 1.5 meter

spacing in the north-south direction. The wooden columns have diam ranging from 4-15 cm, commonly falling within the range of 9-14 cm. Typically, their surfaces are meticulously smoothed, with one end sharpened to penetrate deeply into the ground while supporting the house floor above (Fig. 13). In addition to the systematically distributed wooden columns, numerous other posts and postholes are observed within this archaeological space, possibly indicating traces of reinforcement during its use (Bui et al. 2022: 261; Lai and Le 2020: 49).

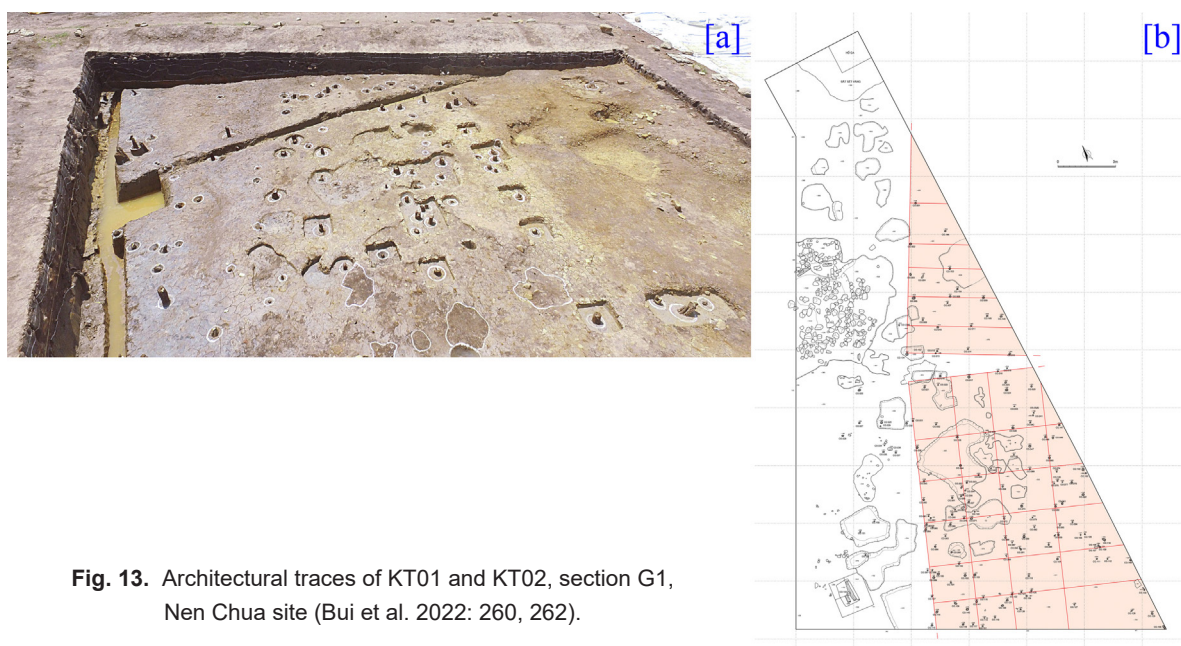


Fig. 13. Architectural traces of KT01 and KT02, section G1, Nen Chua site (Bui et al. 2022: 260, 262).

The Structure NC18.G1.KT02

This structure is located immediately to the north of G1.KT01 and has only partially surfaced in a space of 34 m², featuring 22 wooden columns distributed in five parallel rows in the east-west direction (north deviating to the east by 28 degrees), with approximately 1.5 m between rows and uneven spacing between columns (Fig. 13). The construction technique and distribution pattern indicate similarities with the architecture of KT01 (Bui et al. 2022: 263; Lai and Le 2020: 49).

Based on the comparison of site characteristics and the types of artifacts found, archaeologists have determined that both of these structures belong to a developed residential area of the ancient Oc Eo community, dating from approximately the 1st-3rd century CE (Bui et al. 2022: 270).

The Group with Complex Construction Techniques

The Wooden Structure NC18.A.KT04

This relic has a rectangular ground plan in a northwest-southeast direction (north deviating to

the east by 13 degrees), distributed in section A, measuring 7.42 x 5.7 m, comprising 22 wooden columns and three postholes, placed in five rows with equal spacing of 1.8 m. Each row consists of five columns spaced 1.2-1.7 m apart. Among them, six remaining columns have traces of mortises or tenon joints penetrating through the shaft (Bui et al. 2022: 211). These wooden tenon joints have varying dimensions and are distributed along the length of the structure. They are, however, isolated and may have a function of preventing subsidence and tilting for the columns (Fig. 14). This technique is similar to that found at structure OE.18.GGC.A.H1.KT03 in Go Giong Cat site.

The Wooden Structure NC18.A.KT05

This structure features a rectangular ground plan in the same direction as the one above, covering an area of 11.3 x 5.5 m. This is a unique architectural design where wooden beams, also known as boards, are used to support the column bases. Along the length, six beams are recorded, aligned in a northwest-southeast direction, with an even spacing of 1.9 m, the longest being about 5.5 m,

and buried in the ground. In the middle or offset to either side of these wooden boards, 33 column positions are recorded, distributed in four rows with spacing ranging from 1.1-1.5 m, including six columns positioned perpendicular to the boards (Fig. 15). The combination of the wooden board below and the columns forms a complete framework for the upper structure. Additionally, within the space of this structure, 10 thin wooden planks, similar in width, are oriented in the same direction as the foundation boards, possibly serving as horizontal components connecting the columns above. Furthermore, at the northeastern end, there are traces of a row of posts interspersed between the wooden boards, approximately 0.64 m away from the main columns. Archaeologists suggest that these

posts are not part of the pile system and may have been added for reinforcement during use (Bui et al. 2022: 216; Lai and Le 2020: 50).

The architectural design of the house-on-stilts, designated as KT05, emerges from the same cultural stratum and exhibits nearly identical orientation as KT04, suggesting a contemporaneous construction period for them. Drawing from features, unearthed artifacts, and a comparative analysis with residences previously unearthed at the Oc Eo - Ba The archaeological complex, as well as radiocarbon dating analysis, researchers posit that these two residential constructions belong to the initial phase of the Oc Eo culture, dating back approximately to the 1st-3rd centuries CE (Bui et al. 2022: 224).

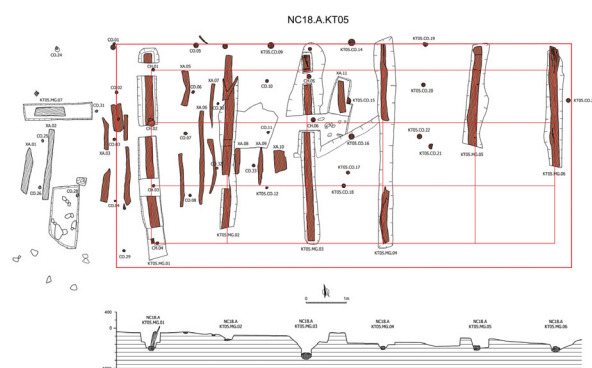
Additionally, at the Nen Chua site, archaeologists have documented remnants of various wooden column structures; however, the absence of a discernible pattern is notable due to their dense and overlapping arrangement. These structures likely signify distinct phases of reinforcement and restoration, particularly in lower-lying regions. In this context, the wooden columns situated along the elevated ridge of the Lung Lon canal could be integral components of the architectural framework, whereas those in lower-altitude zones may have primarily functioned as settlement areas for the adjacent population (Lai and Le 2020: 50-51).



Fig. 14. The trace of KT04, section A, Nen Chua site (Source: Bui et al. 2022: 214–215).



Fig. 15. The trace of KT05, section A, Nen Chua site (Bui et al. 2022: 214–215).



IDENTIFYING THE CHARACTERISTICS OF RESIDENTIAL FORMS OF ANCIENT OC EO INHABITANTS

Although archaeological research has long uncovered numerous traces of wooden posts/ post holes associated with stilt houses and the clay embankments in the Oc Eo culture, as previously noted, identifying a complete structural layout has often been challenging. This limitation stems from constraints in funding, restricted excavation areas, or spatial conditions that do not permit expansion for further study.

It can be said that historical records and ancient texts from various Chinese dynasties serve as invaluable reference sources, offering the earliest and foundational descriptions of the living space of the ancient Funanese community. In the *Nan Qi Shu* [南齐书], which is a historical record of the Southern Qi Dynasty (479-501) compiled in the early 6th century, there is a passage that reads: “They cut down trees to build their homes. The king lives in a raised house. Their fences are made of timber palings. Beside the sea grows a large bamboo with leaves of 8 to 9 feet. They plait the leaves to cover their dwellings. The people also live in elevated houses” (Pelliot 1903: 261). Meanwhile, *Xin Tang Shu* [新唐书], also known as the *Annals of Tang Dynasty* (618-906), compiled in the early 11th century, contains a passage about Funan as follows: “Fou-nan is 7,000 li [里] south of Je-nan; the land is low like that of Houan-wang. The custom is to have walled cities, palaces, and dwellings. The king’s family name is Kou-long. He lives in a double-storeyed belvedere. Enclosures are of palings and bamboo leaves are used to cover the houses” (Pelliot 1903: 273-274). Another record about Funan is mentioned in *Taiping Yulan* [太平御覽],

compiled around 977-983: “The people of Fou-nan are very tall. They live in decorated and engraved houses. They are generous and have many birds and animals” (Pelliot 1903: 280).

Recent excavations and research findings, particularly from the project “Research on the Archaeological Complex of Oc Eo - Ba The and Nen Chua (Oc Eo Culture in Southern Vietnam)” (2017-2020), have, for the first time, enabled archaeologists to document traces of wooden architecture in a relatively complete manner, at least in terms of architectural layout and information regarding the constructed earthen embankments at residential sites. These findings have provided significant insights into the construction techniques, settlement patterns, and living spaces of the ancient Oc Eo community, which utilized wooden stairs, especially in the early period before the 4th century CE. Based on a comparison of two primary sources, historical records and archaeological evidence, archaeologists have determined that the prevalent forms of dwelling among Oc Eo inhabitants likely include either stilt houses, accessed by wooden stairs, or simple embankments on which people resided directly. In some instances, both methods appeared to have been combined to create suitable living environments.

In examining stilt-house dwelling styles, various discoveries reveal a diversity of stilt house structures in terms of size and architectural features. The placement of wooden columns in stilt house construction varies in spacing and quantity, including cases of reinforcement and repair made during house use.

Evidence from architectural remains that enable an overall identification of the buildings, particularly at the Go Giong Cat site (structures KT02 and KT03) and the Nen Chua site (KT01, KT02, and KT05), reveals that stilt houses typically had a rectangular floor plan. These structures generally con-

sisted of six longitudinal rows and four to six transverse rows of columns, forming a layout with an average area of 42 to 45 m² (e.g., GGC.A.H1.KT03 measures 45.7 m²; NC18.B3.KT01 is 42.57 m², and KT02 is 45.35 m²). Some buildings, however, were significantly larger, such as NC18.A.KT05, with an estimated area of approximately 62.15 m², or smaller, like GGC.A.H1.KT02, which measured around 28.56 m² with three longitudinal and four transverse rows of columns. Additionally, there appear to be specific patterns in the spacing between rows and columns. Research results show that the average distance between rows ranges from 1.3-2 m, most frequently around 1.4-1.5 m, possibly corresponding to various structural roles within the stilt house framework. Meanwhile, the spacing between columns shows only slight variation, ranging from 1.45 to 1.8 m. A survey of the remaining wooden column dimensions in these structures shows that they vary in diameter, ranging from 4 to 23.5 cm, with the most common sizes falling between 10 and 18 cm. Large wooden columns are often used to smooth surfaces, whereas smaller ones are typically used directly without any processing.

These structures include wooden columns, which could either be directly embedded into the natural ground or buried and reinforced to enhance stability. Archaeological evidence suggests that these two techniques likely depend on the type of dwelling (whether stilt houses or directly on embankments), the scale of the house, as well as their position within the overall design, whether they served as main support columns, auxiliary columns, or simply as bracing elements for the pillars.

The technique of directly embedding wooden columns can be observed in the KT02 structure of the Go Giong Cat site, which may represent the form of dwelling directly on embankments for the lower classes, thus serving a small living space. Another example is the row of columns in-

terspersed among wooden planks in NC18.A.KT05 architecture at the Nen Chua site was identified as a reinforcement component during the house's repair process. A common characteristic of these columns is that they all have a small diameter, typically ranging from 10 to 13 cm, with some retaining an unrefined natural surface and the tops often sharpened to a point.

Evidence of the technique for reinforcing wooden column bases in the Oc Eo culture was first recorded through findings at Go Giong Cat and Nen Chua, showcasing two different techniques. In the KT03 structure of Go Giong Cat, the base of the wooden column, which has a large diameter, is bored to create a mortise joint inverted U-shaped notch, through which a small rectangular wooden bar is inserted. At Nen Chua, there is a complex system featuring columns with mortise joints that pass through and connect with wooden beams below, along with a network of wooden columns supported by beams. In construction techniques, cornerstones or stones are generally used as the foundations. However, in areas where stones are difficult to obtain, boards are sometimes employed as an alternative. Particularly in alluvial plains, particularly in muddy areas, such pillars without a proper foundation cannot support the weight of the building. Additionally, there is concern that timber may sink. To mitigate this, the foundation plates were placed at the bottom of the pit. These boards are processed in various ways depending on the shape and topography of the pillar, and sometimes multiple boards are used to increase the strength. The differences in the groundwork reinforcement techniques for architecture between the two important sites of the Oc Eo culture reflect, on the one hand, the richness of construction techniques and, on the other hand, may relate to the experience of handling foundations in different types of terrain, with Nen Chua situated alongside the canal and Go

Giong Cat being a mound in the alluvial plain.

The roofing and wall panels that participated in the structure of the stilt house were possibly made from lightweight materials that were readily available and very common in nature, most likely coconut palm leaves. This is also consistent with Malleret's observation (1959: 412-413): "A roof covered with a bamboo leaf. In fact, this is the Nipa palm, scientifically known as *Nypa fruticans*... the leaves are usually 7-8 m long... very suitable for roofing, which is still commonly used everywhere today". The findings at the Go Thanh archaeological site serve as a typical example of such housing structures.

With clay embankments discovered in the Oc Eo archaeological sites, commonly found in the early phase, new research results have provided some information about this residential form.

The embankments were made from pure clay, which could be sourced from the surrounding alluvial plain areas, typically exhibiting a pale yellowish-brown color and a dark grayish-black color. They were tightly compacted and contained almost no artifacts. The surface was relatively flat to accommodate living space, often elevated above the surrounding natural ground to avoid flooding and reduce humidity due to tropical climate conditions. The thicknesses of these embankments varied significantly, averaging between 30 and 60 cm, and they typically tapered towards the edges.

Although there is still too little archaeological data to explore the spatial and temporal relationship between clay embankments and stilt house structures at the Oc Eo residential sites, the evidence provides a basis for certain hypotheses. For instance, with the NĐĐ02 structure at the Go Giong Cat site, although the overall design could not be identified because of the spatial limitations of the excavation trench, it did assist archaeologists in recognizing a thinning phenomenon on

both sides, which may indicate the boundaries of a single house foundation. Combined with traces of post holes or wooden supports recorded on the surface of this embankment, it is possible that these are remnants of a type of dwelling directly on the ground, using wooden columns embedded directly into the earthen structure without any evidence of foundation reinforcement to construct a simple house. Alternatively, the adjacent KT03 structure revealed a combination of a broad embankment with a thickness ranging from 50-60 cm, and the surface was treated to be relatively flat. Above this embankment are the remnants of a substantial stilt house, where wooden columns were inserted into dug holes, and the foundation was meticulously prepared to prevent subsidence, likely indicating that it belonged to the noble class of the time.

In the distinctive environment of the lowland plain, various types of trees such as Acacia, Ceylon ironwood, Yellowish-wood, Golden penda, and Coconut palms were common and easily accessible. These trees were suitable for the natural conditions of the region, including annual floods, a hot and humid climate, and heavy rainfall. Ancient residents of the Oc Eo culture chose them as their primary construction materials for housing and related structures. These are also common materials used to build stilt houses and civil works in the daily lives of southern communities today (Fig. 16). Combined with raised earthen platforms and carefully leveled surfaces to mitigate low-lying moisture, create living spaces, illustrating the adaptability and high flexibility of this settlement type in flooded, riverine environments. On a golden leaf inscription, labeled BTĐT.KC.182/93GT.M1.15 (Fig. 17), discovered in the sacred structure of 93GT.M1 within the Go Thap archaeological complex, there is a carving depicting a simple house supported by four distinctive columns characteristic of stilt houses, with a sloping roof (Dao



Fig. 16. The traditional stilt house model of the people in the Mekong Delta region today (An Giang Province, 2023).

2010: 253-254). This is an intriguing discovery that portrays an intimate image of ancient Oc Eo residents' houses.

In addition to the prevalence of simple stilt house architecture in small to medium sizes, archaeologists have also unearthed numerous large-scale wooden structures, using columns exceeding 20 cm in diameter, featuring circular or octagonal cross sections. Some of these wooden columns were intricately decorated with circular carvings on their shafts along with mortise and tenon joints. These wooden architectural components had large tenons to fit seamlessly with other parts within a unified structure, often adorned with decorative foliage patterns reminiscent of Makara's head motifs.

It can be inferred that, architectural structures vary in size, complexity, and material use depending on their wealth, social status, and position within society, ranging from simple to intricate designs. These structures could employ a range of materials, and might or might not have decorations or different decorative styles. In certain regions, particularly those serving as central hubs for population, economy, and even administration and religion, such as Oc Eo - Ba The, Nen Chua, and Go Thap, distinct settlements of the elite class coexisted with architectural form such as temples and palaces.



Fig. 17. A golden leaf fragment engraved with a stilt house image, Go Thap site (© Center for Archaeology).

These elements contributed to a comprehensive urban structure in the first millennium CE in the Mekong Delta, showcasing development within a society characterized by hierarchical stratification and a structured state organization. This was reinforced by Malleret's (1959: 417) assertion: "We have sufficient reasons to believe that during the Oc Eo period, the ground level was lower than it is today, and that the lost city was a large metropolis where it was customary to have light structures built on stilts... We can also easily imagine a coastal city closer to the sea than it is today, with tides infiltrating the canals, necessitating elevated houses on both sides... We envision this as a large metropolis with lightweight houses concentrated around a few brick buildings..."

CONCLUSION

This study offers evidence for exploring the residential forms of the Oc Eo culture, contributing knowledge to settlement patterns, architectural techniques, and the diverse social life of one of the earliest complex societies in ancient Southeast Asia. By synthesizing historical records and archaeological data, this research highlights how the Oc Eo

community confronted and adapted to the feature environmental conditions of the Mekong Delta, developing various settlement solutions, including stilt houses and elevated clay embankments. These residential forms attested through archaeology at the most significant sites, such as Oc Eo - Ba The, Nen Chua, and Go Thap, demonstrate variations in material use, construction techniques, and spatial layout, that probably echo a vibrant socio-cultural life of major settlement centers within the ancient kingdom of Funan.

Identification of stilt houses as a major residential type among Oc Eo dwellers is one of the primary contributions of this article. Stilt houses, prevalent across multiple Southeast Asian cultures from prehistoric to early historic periods, were a construction choice reflecting a deep understanding of and adaptation to the low-lying, flood-prone environment of the region. Furthermore, archaeological findings from Go Giong Cat and Nen Chua sites demonstrate marked differences in terms of the scale, layout, materials and quality of these structures. The presence of large-scale stilt houses, along with evidence of complex construction techniques, such as mortise joints and reinforced foundations, suggests not only technical advancement, but also the influence of social stratification on residential architecture, corresponding to varied material and social needs.

Another crucial aspect mentioned is the choice and use of materials by the Oc Eo community, including Acacia, Ceylon ironwood, Golden penda, and Coconut palm leaves, which thrive and are common in the flooded conditions of the Mekong Delta. This selection reflects a careful approach aimed at optimizing durability while ensuring local material accessibility. Such material choices facilitated the development of lightweight structures, offering natural advantages in hot and humid delta climates, with ventilation and resilience to frequent

moisture exposure.

Information regarding the characteristics of clay embankments and the combination of stilt houses with embankments as a settlement model of the Oc Eo culture is considered an important architectural innovation documented in this research. While previous studies have mostly recognized that residential traces of the Oc Eo community on clay embankments emerged only during the typical Oc Eo period (4th to 7th centuries CE) (Bui et al. 2017), recent findings at the Go Giong Cat site by the author and collaborators have provided compelling evidence of variously sized clay embankments dating as early as the 2nd to 4th centuries CE. These embankments, which are composed primarily of compacted alluvial clay with minimal inclusions or artifacts, suggest intentional construction for durability and stability. The relatively flat surface of these embankments, often elevated above the surrounding natural ground level, provides dry, stable foundations for building and habitation, adapting to and mitigating the common challenges associated with the delta's tropical climate. The use of clay embankments combined with stilt houses by the Oc Eo community in certain areas highlights their adaptability, optimization of local materials, and modification of the surrounding natural environment to create sustainable living spaces. These factors also indicate similarities, or perhaps a close connection, in the residential traditions of prehistoric and Oc Eo communities in southern Vietnam. They show how these communities adapted to natural conditions while occupying and expanding residential spaces in new territories at the beginning of the first millennium CE.

Findings regarding residential models also helped shed light on the spatial organization of Oc Eo cultural settlements, particularly at significant sites such as Oc Eo - Ba The and Nen Chua, indicating a hierarchical urban structure. In this arrange-

ment, certain elaborate and large-scale housing forms may have been reserved for local elites or communal spaces, with elevated social or religious functions coexisting alongside religious or palatial architecture. Together, these elements form an integrated urban landscape that can serve administrative, economic, and religious functions. This aligns with ancient Chinese texts describing the kingdom of Funan as a hierarchically stratified society with grand palaces and elevated dwellings reserved for the ruling class. These findings indicate that by the first millennium CE, the Mekong Delta had evolved into dynamic settlement centers, with the Oc Eo culture developing infrastructure that supported complex economic and social activities, reflecting a high level of urban planning.

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NOTES

- 1) Earthen or clay embankments are areas where residents utilize clay to elevate the land into high mounds, with the purpose of creating a stable, flat living space that is resistant to dampness and adaptable to the flood conditions of the delta region.

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