

# THE ANGKORIAN WORLD

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# PERSPECTIVES ON THE 'COLLAPSE' OF ANGKOR AND THE KHMER EMPIRE

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The decline of Khmer political dominance in mainland Southeast Asia in the mid-second millennium CE has been a topic of enduring fascination for scholars since the 19th century. The phenomenon is conventionally described as a 'collapse' and is usually traced to some combination of social, political, and economic factors including religious change, shifting currents in international trade, invasion and warfare, and overexertion from the immense building works of the 12th to 13th centuries. In the mid-20th century, a growing preoccupation with long-term relationships between humans and their environment set the stage for another hypothesis: that the elaboration of a vast engineered landscape either created or amplified a series of profound challenges to Angkor's long-term sustainability. In this view, processes such as urban and agricultural extensification, infrastructural development and the rise of densely populated urban areas significantly degraded the local environment, increased dependence on an over-extended infrastructural network, and created systemic vulnerabilities to social and environmental change.

These hypotheses were first systematically elaborated from the 1950s to the 1970s, and since then they have been met with widespread resistance and occasional controversy. For example, few researchers these days accept B.-P. Groslier's precise vision of Angkor as a powerhouse of irrigated rice agriculture. Others have questioned his famous 'hydraulic city' theory on theoretical or even ethical grounds, as scholars have sought to come to terms with the colonial legacies that are clearly entangled with classic notions of 'abandonment' and 'collapse'. On the other hand, evidence from recent work makes it difficult to deny that there were profound demographic and cultural shifts in Cambodia toward the end of the Angkor Period, even if the precise nature and tempo of those changes remain to be elucidated. To explain these transformations remains a central challenge in regional history.

## **Defining the Problem**

In recent years, there has been a broad re-evaluation of the notion of 'collapse' in the archaeological literature (see Hall 2017 for a discussion), even as the notion has been brought to the forefront of the popular imagination by the work of Jared Diamond (2011) in particular. Critics (see McAnany and Yoffee 2009 for a representative cross-section) contend that the very concept of collapse is a legacy of racist and colonial approaches to the past that systematically underestimates and ignores evidence for persistence and resilience in the archaeological record;

cherry-picks or misrepresents the evidence; and offers naively deterministic models to explain the supposed failures of early societies, often in ways that have been politically useful for those seeking to justify present-day occupation and subjugation (Edwards 2008) or, conversely, to promote narratives of nostalgia and loss (Mikaelian 2013, 2016).

These critiques should immediately give us reason to pause and reflect on the validity of the notion of ‘collapse’ as applied to Angkor and the broader Khmer world: fantasies about the ‘decline’ of the Angkorian civilisation have always been used as a tacit justification for European colonialism in Cambodia (Edwards 2005, 2008; Falser 2020), archaeological practise has been tightly linked with the creation of the modern nation-state since the mapping and survey work of the earliest ‘explorers’ who ‘rediscovered’ Angkor and the Khmer Empire (Evans 2007, 31–44), and efforts to restore ‘lost’ cities and civilisations to their former grandeur have featured prominently in political messaging in Cambodia from as early as the Angkor Period (Evans 2007, 124–25) right through to the Khmer Rouge regime in the 20th century (Evans 2007, 107–15).

It is important therefore to define what we mean when we speak of the ‘decline’ of Angkor and the Khmer Empire, to get a sense of whether there is a phenomenon here that actually exists and is worth explaining, and to understand what measures may be useful for quantifying it. A detailed treatment is beyond the scope of this chapter, but in summary, recent attempts to redefine or re-orient the notion of ‘collapse’ have tended to point toward social and political complexity as key considerations in tracing and evaluating the trajectories of past societies (Hall 2017, 1). In this view, following Tainter (1988), the building of societal complexity ostensibly presents as a hugely successful problem-solving tool and in its initial stages encourages population surges; human health improvements; the development of social hierarchy; differentiation and specialisation of economic duties; higher degrees of social, political, and economic integration; and greater information processing and exchange; conversely, ‘collapse’ or ‘transformation’ can be defined as a substantial decline in urban and regional populations, a reduction in social complexity and territorial control and the failure or restructuring of economic and ideological systems (Hall 2017, 1–2).

There is significant evidence that the 13th to 15th centuries at Angkor represented a time of profound transformation in the Khmer world across various domains such as religion, politics, economy, trade, engagement with the outside world, spatial organisation, and material culture (see Coe and Evans 2018, 239–80 for a recent summary). In many cases, the details or even the overall nature of these changes are unclear or contested. Still, we may usefully narrow in on demographic change as a key indicator of broader societal transformations, since it has been the focus of intensive archaeological research in recent years and there is abundant evidence for patterns of residence and occupation in the later Angkor Period (Carter et al. 2018, 2019, 2021; Klassen et al. 2021b).

At the height of the Angkor Period in the 12th to 13th centuries CE, the Greater Angkor region of 3000 km<sup>2</sup> was home to something in the order of three-quarters of a million people (Klassen et al. 2021b), with a densely inhabited, formally planned urban core giving way to a diffuse urban and agricultural network marked by nodes of dense habitation around major temple sites (Evans 2016; Evans et al. 2007, 2013). By the 19th century, however, European accounts describe a sparsely populated landscape consisting of a handful of villages, with two reliable sources from the turn of the 19th and 20th centuries giving population estimates of 2000–4000 people for Siem Reap district and 10,000–18,000 people for the entire province spanning around 10,000 km<sup>2</sup> (Brotherson 2019, 374).

Therefore, historical and archaeological evidence indicates a decline in the population of the Angkor area of around two orders of magnitude between the 13th and 19th centuries, concurrent with seismic changes in the social, political, and cultural landscape of the region. At the

same time, we should move beyond problematic notions of 'collapse' and the 'rise and fall of civilisations' while recognising that understanding the processes at work here provides us with critical insights into long-term socio-cultural trajectories and the making of modern Southeast Asia.

### **Perspectives on Collapse**

The reasons for the 'collapse' of Angkor have long fascinated observers, who typically infer from the existence of massive temples that Angkor had an extremely large population that was overwhelmed and greatly diminished by external environmental or military pressures, or some combination of the two. For instance, Delaporte (1880, 39) assumed that Angkor was home to 'millions'. Indeed, with only two notable exceptions (Coe 1957, 1961; Miksic 2000), the idea that Angkor was a populous city has been the dominant one in the literature since the mid-1800s. Notwithstanding persistent difficulties in defining exactly where the 'urban' space of Angkor begins and ends (see Evans et al. 2023, this volume), it is now reasonably clear that the Greater Angkor landscape was home to between 700,000 to 900,000 people at its height (Klassen et al. 2021b). It is worthwhile, therefore, to re-assess traditional theories of 'collapse', which since the 1970s have tended to converge around a population estimate of around a million or so inhabitants (Groslier 1979).

### **Conflict**

The first detailed European accounts of Angkor in the 19th century drew on local histories, myths and legends, and evidence from Ayutthayan and Cambodian chronicles to argue that the demise of Angkor and the Khmer Empire was due to military conflict with the neighbouring Ayutthayan civilisation (Briggs 1948; Brotherson 2019, 10–16; Vickery 1977), whose capital was 350 km due west of the Angkorian heartland. The dominant view here was that, from around the 12th century onward, expanding populations in present-day Thailand gave rise to ever more powerful kingdoms which by the 14th century began to pose an existential threat to Angkor, and that after multiple invasions in the Angkorian heartland throughout the 14th and 15th centuries, the capital of the Khmer was finally overrun by Ayutthaya.

Over the course of the 20th century, there was growing scepticism about this conventional narrative. Briggs (1948), for example, rejected the idea that there were multiple invasions by Ayutthaya and pointed to a single, decisive conquest of Angkor by the forces of Ayutthaya in 1431. By the 1970s Michael Vickery, after an exhaustive review of the primary sources (1977), also concluded that a series of 'invasions' by Ayutthaya was unlikely and pointed instead to a single occupation event lasting from 12 to 15 years. The idea of an 'invasion' is difficult to square with other lines of evidence: although signs of fortification and defensive modification of Angkor's urban infrastructure suggest an increased concern for the security of its population from perhaps the 13th century onwards, these alterations are difficult to date with precision, and there is no archaeological evidence at all which suggests a violent collapse or destruction of the capital (Brotherson 2015, 2019; Klassen et al. 2021a). The few scholars who have studied the issue in detail in recent years tend to underscore the remarkable cross-pollination in religious and artistic expression between Ayutthaya and Angkor in the 15th to 16th centuries (Polkinghorne et al. 2013). Nevertheless, the notion of an Ayutthayan 'sacking' of Angkor continues to enjoy widespread currency in the tertiary literature on Angkor (Hall 2018).

Even if we do accept that the Ayutthayan invasion of 1431 was as violent and as final as conventional sources would have us believe, then, as Michael Vickery has noted, this still leaves

us with the question of why Angkor, which had been resilient in the face of external military incursions for several centuries, was weak enough to finally fall to Ayutthaya in the mid-1400s (1977, 509–10). Since the 1800s, scholars have therefore sought to identify the ultimate cause of Angkor's decline in addition to the proximal explanation provided by military aggression from Ayutthaya. Typically, these theories have revolved around one or two main ideas: that overbuilding and overextension of the Empire in the 12th to 13th centuries 'exhausted' Angkorian society and that the transition from Brahmanism to Buddhism as the state religion undermined the rigid ideologies and power structures that had traditionally held Angkor together (Brotherston 2019, 10–23; Polkinghorne 2018).

### ***Overextension, Exhaustion, and Religious Transformation***

King Jayavarman VII, whose reign spanned around 40 years straddling the turn of the 12th to 13th centuries, was responsible for more monumental construction activity than any of his predecessors. In addition to temples such as the Bayon and Ta Prohm at Angkor, his works included massive and sprawling temple complexes across the Empire at places like Banteay Chhmar and Preah Khan of Kompong Svay and many hundreds of smaller temples dotting the region. His civil engineering works were also unmatched by any monarch before or after: cities and giant reservoirs were built at Angkor and beyond, connected to Angkor by a network of earthen highways (Hendrickson 2010, 2012). The sheer scale and ambition of these works has led many to believe that his reign exhausted the Empire by depleting its resources or demoralising the work force, making it vulnerable to invasion by foreign invaders; in some accounts, a rebellious and overworked populace revolted against Brahmanical rulers by adopting the more democratic or anti-authoritarian faith of Theravāda Buddhism (Briggs 1999[1951], 257–61; Brotherston 2019, 15; Finot 1908; Polkinghorne 2018).

Despite its widespread currency since the 19th century, there is no particular evidence to support this hypothesis, and there are some reasonably compelling counter-arguments. As Vickery (1977, 511) has pointed out, the building spree of Jayavarman VII occurred more than two centuries before the purported sacking of the capital, which would have provided ample opportunity to recover and regroup from the mammoth building efforts of the 12th to 13th centuries. The raw materials from which cities and temples were built—stone, iron, thatch, and earth—remained in abundant supply. Moreover, in many cases—for example, Angkor Thom (Gaucher 2017) and Preah Khan of Kompong Svay (Hendrickson and Evans 2015)—we see that temples and cities typically ascribed to the reign of Jayavarman VII have long and complex life histories and were developed over decades or even centuries leading up to his reign.

Indeed, a new and as-yet unpublished inscription, K. 1297, brings to light the very important career of the Buddhist king Tribhuvanāditya (r. 1149–ca.1180 CE) and underscores that all but one of the major kings for a 200-year period from 1080 to 1270 CE were Buddhist (Sharrock 2018), which tends to undermine the supposed exceptionalism of the reign of Jayavarman VII. This also has far-reaching implications for another recurring explanation for the vulnerability of Angkor in 1431: that the transition from Brahmanism to Buddhism as the state religion—and in particular the rise of Theravāda Buddhism toward the very end of the Angkor Period—undermined the power structures that had held together a fractious Empire over many centuries. In this view, with its inward and personal focus, Theravāda was a subversive force against a state ideology that had for many centuries revolved around religious and personality cults focused on Brahmanical kings (Briggs 1999[1951], 259–60; Brotherston 2019, 18–19; Finot 1908; Polkinghorne 2018, 2022).

First of all, it is important to underscore, after Stark (2019), that the Angkorian state was always inherently fragile under kings of all religious faiths. Second, although we can imagine that the transition to Buddhism as a state religion may have challenged longstanding power structures in the Angkorian World, we must once again recognise that it was a process that unfolded over centuries, that Angkorian religion was always characterised by coexistence and syncretism (see Estève 2023, this volume), and that the high-water mark of the Khmer Empire was under the reign of Buddhist kings (Hendrickson 2010, 2012; Sharrock 2018). There is nothing *necessarily* or inherently 'democratic' or 'anti-authoritarian' about Theravāda Buddhist political ideology *in practise*: one only needs to look across the Indian Ocean to early historic and medieval Sri Lanka to find Theravāda Buddhist monarchies of the 'Classic' Period that were stable, durable, and capable of undertaking and sustaining vast engineering projects while ruling over diverse and cosmopolitan societies (Coningham et al. 2017). Indeed, as Vickery (1977, 511) has pointed out, it is logically incoherent to claim that an ascendant Theravāda Buddhist state—Ayutthaya—was only able to overcome Angkor because the Khmer state was doomed by the embrace of Theravāda Buddhism.

### ***Trade and Globalisation***

The historiography of Southeast Asia is characterised by a distinctive model of the growth and decline of early civilisations and their urban centres, revolving around indigenous responses to exogenous cultural currents. In this view, early chiefdoms along the 'Maritime Silk Road' developed into complex societies through exposure to Chinese and Indian socio-cultural systems (see e.g. Hall 1982; Higham 2014; Mabbett 1977). Through the selective appropriation of elements of Indian culture, in particular, indigenous elites were able to fundamentally transform Southeast Asian societies, eventually translating the success of coastal trading centres into vast inland agrarian-based empires largely disengaged from the changing fortunes of international trade. Extending this model some centuries forward in time, the logical corollary has been that a resurgence in maritime trade in the 12th to 15th centuries driven by China (Vickery 1977, 515–22) and in subsequent centuries by Europeans (Reid 1988, 1993) presented a profound challenge to the sustainability of the classic inland agrarian empires of Southeast Asia. By the 15th century, they had collapsed, as local elites increasingly sought to exploit the economic opportunities afforded by globalisation, and coastal, trade-oriented centres of power flourished once again across mainland Southeast Asia (see also Hall 2023, this volume).

Although compelling on some levels, this model is not without its problems. Lieberman (1995), for example, points out the substantial variability between circumstances in particular sub-regions of Southeast Asia and calls into question Reid's notion of an overarching 'Age of Commerce'. Wade (2009) points out that a burgeoning maritime trade existed in the region for several centuries before the 'Age of Commerce', even as the great inland empires of Southeast Asia developed to their apogee. Although an inland agrarian capital, Angkor was always connected to regional and international trading networks, and according to studies of material culture by David Brotherson, it remained so for centuries after its 'collapse' (Brotherson 2019). Reynolds (1995), meanwhile, suggests that the historiographical fascination with trade and external influences is a function of Eurocentric scholarship; still others point to the over-reliance on external records, in particular Chinese texts, which are often trade-centric (Stark 1998; Stark and Allen 1998). Finally, we may reasonably question the degree of relative trading advantage conferred by any relocation to the Phnom Penh region, since it, too, sits at a distance of hundreds of kilometres from the coast by way of (the very same) difficult-to-navigate network of Mekong Delta waterways.

Recent research has undoubtedly highlighted how Post-Angkorian urban centres were very much engaged in, and oriented towards, burgeoning international trading activity in the Early Modern Period (Polkinghorne 2018; Polkinghorne et al. 2019; see also Polkinghorne and Sato 2023, this volume). Once again, however, we are also left with the question of proximate vs. ultimate causes. As Vickery (1977, 522) notes:

One question which cannot yet be answered is why the Angkorean elite, or part of it, decided sometime in the 13th–14th centuries that it would be worthwhile to shift emphasis from inland agrarian activities to integration in the China–Southeast Asia trading network, or, phrased in another way, why the new Mekong ports were able to accumulate enough wealth to attract people away from Angkor.

### ***The Hydraulic City, Climate, and Infrastructural Breakdown***

Since at least Delaporte (1880, 39), many (if not most) observers have believed that the success of Angkor derived at least partly from the ability to manage seasonal monsoon water flows and irrigate rice fields using massive hydraulic infrastructure. It was B.-P. Groslier who, from the 1950s onwards, developed this notion into a coherent theoretical framework (most fully elaborated in Groslier 1979; see Evans 2007 for a broader overview). According to Groslier's famed 'hydraulic city' theory, the immense, state-run network of *baray*, reservoirs, and canals around which the city of Angkor cohered could have enabled the harvest of multiple crops of rice per year and certainly acted as a hydraulic failsafe device, 'smoothing out' disruptive fluctuations in the yearly monsoon by storing water and, when necessary, distributing it across vast stretches of the landscape for irrigation. According to Groslier, however, the system carried within it the seeds of its own downfall, as overexploitation led to erosion, siltation, and soil degradation. A race to the bottom ensued: new channels and reservoirs were dug to replace defunct sections of the network, with ever-decreasing returns, until the system ceased to function entirely. With Angkor's elites no longer able to guarantee the provision of water and rice to their subjects, the polity itself finally fell victim to its enemies.

Groslier's 'hydraulic city' theory was problematic for several reasons (Bourdonneau 2010; Evans 2007) and provoked a fierce debate that has still not been entirely resolved (see Terry Lustig et al. 2023, this volume). For example, recent scholarship has tempered his overly generous estimates of the hydraulic system's capacity to sustain additional population numbers (Acker 1998). Nevertheless, as Pottier (2000), Fletcher et al. (2003, 116) and Evans et al. (2013, 12598) have argued, even a modest increase in rice production through irrigation could have played a key role in stabilising the annual food supply. Crucially, it would have allowed for the support of a large and specialised population of non-rice-producers in the densely inhabited urban cores that developed throughout the 11th to 13th centuries (Evans 2016; Evans et al. 2013); conversely, failure of the system would have disrupted that support and undermined the foundations of Angkor as an urban society (Brotherson 2019, 339).

Moreover, evidence has emerged in recent decades that supports elements of Groslier's narrative, although perhaps in ways that he may not have precisely foreseen. The emergence of long-term, high-resolution paleoclimate data is a case in point. Analysis of tree ring data has shown that the region suffered a series of severe and prolonged droughts, punctuated by episodes of heavy rain, in the mid- to late 14th and early 15th centuries (Buckley et al. 2010). These would have dealt a double blow to Angkor's hydraulic infrastructure: sustained drought overtaxed the capacity of the *baray* to act as a 'failsafe', while rapid floods caused critical damage to key components of the hydraulic network and threatened habitation areas. Indeed, the



archaeological record shows several instances of failure and hasty repair of the hydraulic infrastructure (Evans et al. 2007, 2013). Eventually, the damage to the water management system may well have become so severe that repair was either impossible or simply too costly to pursue (Buckley et al. 2014). As shall be seen subsequently, however, although these climatic stresses broadly coincided with the period of Angkor's decline, significant demographic and cultural shifts were already in motion by this time (Brotherson 2019; Penny et al. 2019).

### ***Engineering, Inertia, and Adaptive Capacity***

Despite the so-called 'collapse' of Angkorian civilisation, many of its works have proven remarkably durable: most of the great temples remain, of course, and the *baray* still stand, even if not all retain water. The floodplain between the Tonle Sap and the Kulen hills is crisscrossed by the remains of hundreds of kilometres of canals, roads, and causeways constructed during the Angkor Period. Roland Fletcher has argued that it is precisely the scale and durability of these monumental constructions that contributed to Angkor's vulnerability and eventual decline (2009, 2012). In this view, 'The huge scale and interconnectedness of the network would largely have precluded any abrupt and easy alterations to the system. The system, therefore, suffered from severe inertia' (Fletcher and Evans 2012, 53). In essence, Angkor's infrastructure imposed a path dependency effect, as infrastructure became progressively less adaptable to changing circumstances, and society became ever more limited in its range of responses to external challenges. This line of reasoning revives some of the fundamental ideas of the 'hydraulic city' model within a new theoretical framework: note that Groslier, too, commented that 'once they [the Khmer] had adopted their course of action, they found themselves as if dragged down the slope without any power to stop themselves' (Lustig and Pottier 2007, 174).

Lending support to this view is an analysis by Penny et al. (2018) of Angkor's hydraulic network, drawing on systems theory. Penny et al. conclude that because of its immense size and the functional interdependence of its many parts, the system in its final phase of development was highly vulnerable to cascading failure in response to even moderate perturbation. The previously identified climatic stresses of the 14th and 15th centuries (Buckley et al. 2010, 2014) could easily have triggered such a failure, leading to breakdown within the water management network and significant attenuation of the diverse practical and symbolic functions that it served.

A similar lack of adaptive capacity can be seen at other settlement complexes within the Angkorian World. At Koh Ker, a provincial centre that briefly blossomed as the capital of the Empire in the mid-10th century, a single, unprecedentedly large water control structure in the form of a 7-kilometre-long dam was responsible for as much as 85% of the water supply (Klassen 2018). When structural flaws in the dam's construction led to its failure, Lustig et al. (2018) argue that the resulting damage to Koh Ker's subsistence as well as to royal prestige contributed to the subsequent decision to move the seat of power back to Angkor.

### ***Mobility and Diaspora***

As we have seen, the long period between the 13th and 19th centuries saw a decline in the population of the Angkor region of up to two orders of magnitude, raising the obvious question of what kind of fate befell such a large population. In the conventional narrative that held sway for much of the 20th century, the answer was straightforward, if extraordinary in its claims: following the devastating Ayutthayan invasion of 1431, the urban population abruptly moved south, along with its kings, to the new capitals established near the confluence of the Mekong and Tonle Sap rivers. Briggs (1999[1951], 261), for instance, described the end of Angkor as



‘the sudden and permanent movement of [an] immense mass of people from one side of the kingdom to the other’.

While much of this traditional narrative has been called into question, a more recent perspective, advanced by Lucero et al. (2015), also envisages an episode of significant demographic movement, in which infrastructural breakdown induced by climate change triggered both political reorganisation among the elite and abandonment of the metropolitan heartland by the farming population. In this model, the latter demographic abandoned the agricultural mode dependent on hydraulic infrastructure and reverted to more sustainable practices in the peripheral regions of the former Empire. Suggested parallels to this process can be seen in Sri Lanka and Mesoamerica, where other low-density, agrarian-based urban complexes, under similar circumstances, likewise experienced a rapid decline and a move into an ‘urban diaspora’ on the fringes of their polities.

Others have pointed to the current lack of evidence for mass migration (Evans 2016; Polkinghorne 2018). Analysis of remote sensing data for the Post-Angkorian capitals of Srei Santhor, Longvek, and Oudong has made it clear that they could not have housed populations at anywhere near the scale of those of Angkor, casting doubt on the notion that urban populations migrated along with the political centre of gravity. Instead of moving away *en masse*, populations may simply have fallen over time in the absence of the food security that the urban water management system had provided. In this view, the ‘illusion of pre-modern mobility and urban disjuncture’ (Evans 2016, 172) created by the movement of royal centres across the political landscape masks a far slower process of gradual demographic decline.

### ***Resilience, Continuity, and the Scale and Tempo of Decline***

In the current literature on Angkor, it is common, and unfortunately still necessary, to emphasise that Angkor was never completely abandoned, in contrast to the popular myth of a ‘lost city’ in the jungle (see e.g. Polkinghorne 2018). Increasingly, scholars underscore the degree of continuity between the Angkor Period as traditionally defined and the subsequent centuries, and various lines of investigation have converged that point to a complex and protracted period of decline spanning several centuries instead of a sudden and precipitous ‘collapse’ (Castillo et al. 2018; Hall et al. 2021; Penny et al. 2019).

Stratigraphic and palaeobotanical analysis of the Angkor Thom moat by Penny et al. (2019) indicates that land use patterns in the surrounding area, the very heart of Angkor’s urban complex, began to shift in the early 1300s, suggesting a gradual demographic decline that predated the severe droughts of the mid-14th century by a matter of decades and the supposed Ayutthayan invasion by more than a hundred years. By the end of the 14th century, the moat was overgrown and appears no longer to have been maintained. Similarly, inside Angkor Thom geochemistry, palynology, and fire history analysis demonstrate that from the 14th century land use attenuation continued, with the exception of a possible short period of reoccupation in the 16th century (Hall et al. 2021). Ceramics survey of an array of sites in central Angkor likewise shows that a contraction in the range of settled spaces took place over the course of the 14th century (Brotherson 2019, 323–40).

If population numbers and centralised control at Angkor were much reduced thereafter, key parts of the complex nevertheless remained in use. The accounts of early European visitors indicate the continued existence of an urban centre at Angkor in the 15th to 16th centuries (Groslier 2006). Religious and economic activity and even architectural restoration works continued into the 15th and 16th centuries (Castillo et al. 2018). Some of these projects, such as the reconfiguration of Phnom Bakheng and the Baphuon into enormous representations of the Buddha, are

of a considerable scale, indicating the presence of a sizeable number of worshippers (Leroy et al. 2015; Polkinghorne 2018; Polkinghorne et al. 2013). At Angkor Wat, similarly converted into a Theravāda sanctuary and pilgrimage site, excavation and radiocarbon dating hint at a complex occupation history extending as late as the 18th century (Carter et al. 2019; Polkinghorne 2022). Continuity is also apparent in the more peripheral agricultural zone of Angkor. While ceramic remains decline there from the 14th century onwards, its dispersed settlement pattern nevertheless persists into the 16th and 17th centuries (Brotherson 2019, 353–64). Overall, the evidence seems to underscore the long-term resilience and durability of rural, agrarian life at Angkor and beyond, especially when compared to the apparent fragility of the Angkorian state and the urban centres populated by elites (Brotherson 2019; Lucero et al. 2015; Stark 2019).

Turning to the other urban complexes in the Angkorian World, the chronology of collapse is complicated further, as a series of palaeobotanical studies led by Tegan Hall (2017) and Dan Penny has shown. Mahendraparvata in the Kulen hills was largely abandoned as an urban centre in the 12th century (Penny et al. 2014). The ephemeral 10th-century capital of Koh Ker, on the other hand, appears to have maintained a relatively intense degree of occupation until the 15th century, when populations at Angkor had already fallen substantially (Hall et al. 2018). Finally, the complex of Preah Khan of Kompong Svay saw a gradual attenuation of land use during the 14th century, but occupation and iron production at the site continued for another two or three centuries (Hall et al. 2019). Overall, it would seem that the 'collapse' of settlement in the Angkorian World was a protracted process, starting as early as the 12th to 13th centuries in some areas, gathering pace in the 14th century in particular at Angkor, with a 'long tail end' and a significant degree of variability in the life histories of individual settlement complexes across the region, depending on localised factors (Hall 2017).

## **Discussion and Conclusion**

Broadly speaking, our view of these processes is complicated by shifts in material culture in the late Angkor Period towards less durable materials, which have much less visibility in the archaeological record (Coe and Evans 2018, Chapter 8; Polkinghorne 2018): inscriptions in stone gave way to manuscripts inscribed on palm leaves and other more perishable media; religious construction began to privilege the reconfiguration of existing masonry structures and the use of wood and brick as architectural materials, instead of raising vast stone monuments from scratch; and the production of stone statuary diminished relative to the production of works in other media such as wood. All of these processes intensified and became well-established in Early Modern Cambodia, as Khmer society transitioned decisively away from re-engineering entire landscapes and from vast, industrial-scale exploitation of stone resources, towards a suite of materials and behaviours that is more recognisably 'modern' in character and that persisted until the 20th century.

As with questions of urbanism (see Evans et al. 2023, this volume), a large part of the difficulty here derives from ill-defined categories, loose definitions, and inadequate consideration of scale (both spatial and temporal). The term 'collapse' implies a loss of social complexity that is sudden and catastrophic, and even the term 'transformation' requires that we define a particular temporal frame of reference in order to identify it or present it as a compelling alternative to 'collapse'. Again, the unique scale of Angkor creates a dilemma, since we may choose to see the Angkor region as a succession of distinct and relatively fragile urban centres spanning a period from the mid-first millennium CE to the mid-second millennium CE, prone to constant transformation and change, or, on the other hand, and on a completely different spatial scale, a uniquely resilient and sustainable urban complex which endured as the capital of the Empire for half a millennium. Seeing 'the end of Angkor' through either of these lenses necessarily changes our perception of the

significance and uniqueness of the changes that took place at Angkor in the 14th and 15th centuries CE and also the degree to which the ‘shifting capitals’ that came after Angkor in the Middle Period (see Polkinghorne and Sato 2023, this volume) represent something different and new.

The lack of archaeological data is also a serious problem. In particular, more spatial and chronological resolution is needed within our data to elucidate demographic change and trajectories of both urbanism and agriculture. This is particularly true of the Early Modern Period, a long-neglected era that is not only deserving of study in its own right (see Polkinghorne and Sato 2023, this volume) but whose story will also have much to tell us about the end of Angkor and its Empire. Again, the sheer scale of what was achieved at Angkor creates a specific set of practical and interpretive problems: the amount of archaeological excavation that has been completed at Angkor is vanishingly small in relation to the spatial extent of the archaeological remains, and this situation is unlikely to ever change. For now, there is a wide zone of archaeological uncertainty between data from excavations focusing on household archaeology, which offer rich chronological detail but are very constrained in spatial scale (see Carter et al. 2023, this volume) and new archaeological maps that provide excellent spatial coverage but relatively coarse chronological resolution (see Evans et al. 2023, this volume). Studies of pollen have already gone some way to filling in this broad lacuna (see Hall and Penny 2023, this volume); in the future, we may hope to complement that work with other approaches, for example, using biomarkers to infer demographic change and using environmental DNA to infer land-use change over wider areas with much higher spatial and temporal resolutions.

In conclusion, what emerges from a quarter-century of intensive archaeological research into the decline of Angkor and the Khmer Empire is a complex set of data that moves us further away from neat explanations such as ‘exhaustion’, ‘sacking’, or ‘religious transformation’. Instead, recent work tends to suggest that the development of massive, inertial infrastructures of a particular model severely constrained the available responses to specific social and environmental changes, that this lack of adaptive capacity characterised settlement complexes across the Angkorian World, and that transformations were relatively long and drawn-out and thus inconsistent with longstanding theories of ‘collapse’. Although significant gaps remain in our knowledge, the causal linkages between climate variability, societal challenges, and large-scale transformations are particularly well articulated in the Angkorian World and compel us to move beyond merely noting the correlation between events like megadroughts and significant societal change. As more data become available, there will also be debate and discussion about the role of exogenous forces such as globalisation in shaping the trajectory of Southeast Asian societies and how to balance that with evidence for indigenous agency, about how we may assign proximal and ultimate causes to transformations at specific scales of time and space, and about the extent to which those transformations may be explained by more generalised social theory (see e.g. Fletcher 2009; Hall 2017; Hawken and Fletcher 2021; Lucero et al. 2015; Penny et al. 2018). In the meantime, one thing that we may conclude with relative certainty is that the evidence is inconsistent with conventional narratives that proposed an abrupt and dramatic ending for Angkor deriving from one or two factors in isolation.

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