



McDONALD INSTITUTE CONVERSATIONS

# The Evolution of Fragility: Setting the Terms

Edited by Norman Yoffee



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of Fragility:  
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Edited by Norman Yoffee

*with contributions from*

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Norman Yoffee, 2019

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## Chapter 7

# Diversity, variability, adaptation and ‘fragility’ in the Indus Civilization

Cameron A. Petrie

### Fragile and/or robust? (Re-)Introducing the Indus Civilization

South Asia’s Indus Civilization was a major Old World civilization, though it is not always included in comparative syntheses (e.g. Trigger 2003; see Wright 2010).<sup>1</sup> The settlements of the Indus urban phase (c. 2600/2500–1900 BC) were distributed across an extensive area of the plains, piedmonts and hills of the Indus River basin and adjacent areas in modern Pakistan and India, and were contemporaneous with the late Early Dynastic, Akkadian, and Ur III periods in Mesopotamia and the Old Kingdom and First Intermediate period in Egypt (Yoffee this volume; Morris this volume). This contribution will demonstrate that the Indus Civilization provides a rich yet somewhat restricted cultural data set that is well suited for exploring the dynamics of fragility as well as robustness, resilience and sustainability in a distinctive Old World cultural context.

Part of the distinctiveness of the Indus Civilization derives from the fact that a relatively small number of Indus settlements grew to a substantial size (80+ ha), and they thrived for 600 to 700 years. Typically regarded as cities, these large settlements were polycentric and underwent repeated and potentially constant phases of rebuilding and remodelling. They also appear to have been the exception rather than the norm within the overarching Indus settlement system, as the majority of contemporaneous settlements were town or village sized. This pattern suggests that the Indus Civilization was predominantly rural, which has implications for its social, economic and political structures. Furthermore, it has long been recognized that the extensive area occupied by Indus populations was marked by considerable diversity in climate, hydrology, and ecology, though the nuances of this variability are still being characterized (Petrie et al. 2017). This overarching diversity has important

ramifications for the degree of local-scale ecological variation, and the ways that Indus populations were adapted to those ecological regimes. It also has significance for understanding whether the social, economic and political configurations that were manifested in urban and rural contexts were resilient and/or sustainable in the face of environmental change (Petrie 2017; Petrie et al. 2017, 2018).

The Indus cities (and the Indus Civilization as a whole), present many of the hallmarks of state-level entities, but they frustrate easy categorization, and many fundamental aspects of Indus socio-political organization and economy are debated. Part of the challenge lies in the fact that Indus cities and elites do not present themselves in ways that draw simple parallels to other contemporary complex societies, particularly those of the ancient Near East. This is most evident in the oft-noted lack of monumental religious edifices, obvious palatial structures or portraiture, all of which suggest a lack of rulers (*cf.* Possehl 1998). The reinterpretation of a number of buildings is, however, encouraging re-evaluation of various factors. What can be stated definitively is that there are fundamental differences between the socio-economic and political organization of the Indus Civilization and its Old World neighbours. The polycentric nature of Indus cities is suggested by the use of walls and platforms to formally demarcate distinct zones within cities and other settlements where what appear to be large- and small-scale public and private buildings were present, and economic and productive activities took place. Indus populations do not display overt hierarchical differentiation, but were characterized by heterarchical social structures, and there are strong indications they engaged in both communal activities and collective action (*cf.* Blanton & Faragher 2008, 2016; DeMarrais & Earle 2017). Furthermore, the distribution of Indus settlements indicates that there were distinct relationships between individual cities and between

cities and smaller settlements, all of which have implications for our understanding of Indus social, economic and political structures.

Inscribed objects, seals and sealings were used during the urban period, but the texts cannot yet be translated, and there is a lack of unequivocal references to Indus cities in later historical, mythological or religious texts. This means that compared to ancient Egypt and Mesopotamia, there is much that we cannot comment on with textual support. It is clear, however, that the use of Indus signs diminished and ultimately ceased by the end of the first century of the second millennium BC, and this coincided with the decline and abandonment of all but one of the large-scale Indus urban centres, the cessation of a range of elaborate craft processes, and the reduction of the range and scale of economic interaction (e.g. Possehl 1997a; 1997b). This evidence leaves no doubt that Indus populations witnessed major socio-economic change in the late third/early second millennium BC, and there is at least some validity in describing Indus urbanism as an ‘experiment’ (Petrie 2013). Numerous causes for this process of transformation have been proposed, including climate change, but definitive evidence and consensus remain elusive (Petrie 2017).

Given the evidence for socio-economic change and its potential relationship to climate, it is perhaps no surprise that the urban phase of the Indus Civilization (c. 2600–1900 BC) has been mentioned in discussions of the fragility of early cities and states (e.g. Yoffee 2015, 2016; Middleton 2017; Scott 2017). Importantly, Yoffee (2016, 1062) has previously put the Indus Civilization forward as a case that has potential to disrupt aspects of the developing ‘fragility’ narrative, and explicitly groups Indus cities and Teotihuacan as ‘anomalies in my scheme of the extreme fragility of early cities’. This anomalous status largely appears to derive from the likelihood that Indus cities ‘flourished’ for many centuries and were thus relatively long-lived (i.e. they were ‘robust’), but it is also influenced by our inability to read Indus texts, and the apparent lack of monumentality, obvious palaces and images of rulers. Middleton (2017, 93) has pointed out that for the Indus Civilization, political changes ‘are not visible to us as they are in some other societies’, which is reflected by the fact that Yoffee (2016, 1062) has only been able to note that Indus cities will have had ‘ups and downs’. Does this mean that they were fragile? It is arguable that the relative longevity of the Indus cities, combined with a lack of evidence that would provide detailed insight into their political organization, actually creates a fundamental impediment to understanding the nature and impact of short-term political change that lies at the core of the fragility narrative. The nature of

the Indus evidence therefore encourages reflection on how successful we can be at characterizing and discussing politics, states and fragility in the absence of texts.<sup>2</sup> Furthermore, given the importance of longevity and chronology for understanding fragility, the Indus case makes it possible to reflect on the appropriate time-scale for considering robustness, resilience and sustainability. Yoffee (2015, 2016) has previously suggested that some early cities only lasted one to two centuries, but with the Indus urban period being notably longer. The Indus case also encourages us to discuss whether there is a difference between fragile cities and fragile states. There has been much consideration of the fragility or robustness of the city-state (e.g. Yoffee 2015, 552–7, 2016; Scott 2017), but ‘the city’ and ‘the state’ each have different socio-political trajectories, and it is worth disentangling nuances – particularly in situations where the nature of political control remains unclear. The Indus case emphasizes the importance of the rural component of society, and there appear to be different trajectories for resilience and sustainability in urban and rural contexts.

This contribution assesses the dynamics of fragility, robustness, resilience and sustainability in the Indus Civilization. It provides an overview of urban and rural Indus settlements, then outlines the environmental contexts within which Indus urbanism developed, and reviews the evidence for how Indus populations were adapted to those environments. Debates about Indus social, economic and political structures within and between cities are reviewed, and the decline of Indus urbanism is considered. All of this evidence has implications for our understanding of fragility, robustness, resilience and sustainability in the Indus Civilization, particularly in terms of the way these concepts relate to urban and rural contexts. The contribution will conclude by outlining how the Indus context appears to be marked by contrasting urban and rural dynamics, where the ostensibly robust urban entities were ultimately fragile and unsustainable in the face of major and long-lasting socio-economic and environmental stresses, while adaptable and constantly transforming rural lifeways appears to have been both resilient and sustainable.

### **Indus settlements: from village to city (and back?)**

Indus cities were the culmination of protracted indigenous processes that began in village-sized settlements dispersed across a variable and diverse environmental milieu, which were characterized by considerable variation in life-ways. The cities appear to have grown to a substantial size over a short period between c. 2600–2500 BC, implying that the shift from small



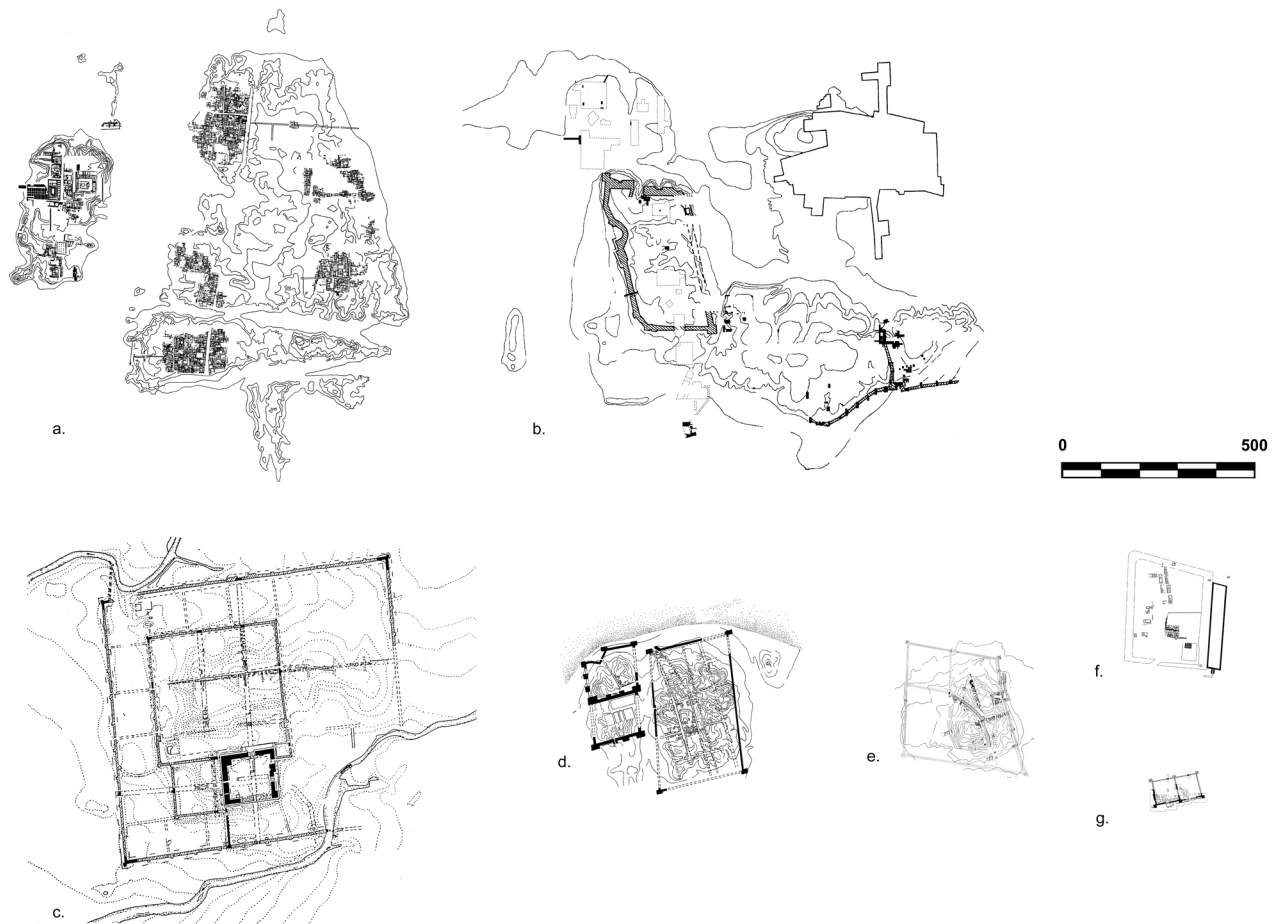
and medium sized settlements to large-scale urbanism was relatively swift. The vicissitudes of excavation mean that we know little about the formative stages of most of the urban centres, but accepted chronologies (e.g. Kenoyer 1991, 1997; Possehl 1999, 2002) suggest that most Indus cities were occupied for 600–700 years – until c. 1900 BC. Importantly, villages and rural lifeways continued being an essential element of Indus settlement systems during the urban period, and villages may well have housed the majority of the settled population (Madella & Fuller 2006, Fig. 9; Parikh & Petrie in press). To understand Indus society, it is imperative to consider both the urban and rural aspects of Indus life.

#### *Urbanism in the Indus context*

As far as we are aware, there were four to five large-scale (80+ha) Indus settlements (i.e. cities; Fig. 7.1): Mohenjo-daro, Harappa, Rakhigarhi, Dholavira and also potentially Ganweriwala, though it was almost

certainly smaller. These cities were considerable distances apart (between 280 to 835 km as the crow flies; Kenoyer 1997, Table 4.2; 1998, Table 3.1; 2008, 188), and situated in different parts of the greater region occupied by Indus populations (Wright 2010, 333; Petrie 2013, 87, 91, 93). The intervening areas were inhabited by populations living in medium and small sized settlements, with the majority of these being village-sized, suggesting that most of the Indus population were rural rather than urban (Wright 2010; Petrie 2013; Petrie et al. 2017; Parikh & Petrie in press). With the exception of Dholavira, which was on an island in the Rann of Kutch, the Indus cities were each located far out on the alluvial plains and in different ecological zones (Petrie 2017). Their number and distribution clearly contrasts with that of the urban settlements in the late Early Dynastic, Akkadian and Ur III periods in Mesopotamia (Petrie 2013; cf. Adams 1981, Figs 29–31).

The Indus cities (and also a number of smaller sites) are each distinctive, but are also broadly similar



**Figure 7.1.** Plans of Indus cities and smaller settlements, including a. Mohenjo-daro, b. Harappa, c. Dholavira, d. Kalibangan, e. Banawali, f. Lothal, and g. Surkotada. All plans are oriented to north, and are shown in the same scale (image C.A. Petrie; after Petrie 2013: Fig. 5.1).

in being made up of multiple mounded areas that incorporate major platforms and/or substantial enclosure walls, as well as houses, drains and wells made of mud-brick and/or fired-brick, with stone also being used to varying degrees (Fig. 7.1; Possehl 2002; Kenoyer 2008; Wright 2010; Petrie 2013; Sinopoli 2015). The inhabitants of these cities (and many smaller settlements) produced, used, and exchanged distinctive types of material culture at least some of which is often described as being uniform (e.g. Kenoyer 2006, 55, 62; Wright 2010, 23, 326–30). This material assemblage included black-painted red-slipped pottery, carved steatite seals, cubical weights, ceramic figurines, bangles made of various materials (clay, shell, copper, faience, and stoneware), and beads made from semi-precious or precious stones, and beyond the cities themselves, it is this material that epitomizes the Indus Civilization. Vidale & Miller (2000, 143ff; Vidale 2000, 127ff.) have suggested that the elaborate nature of many of the Indus craft products should be regarded as an explicit display of technical virtuosity.

The painted pottery, clay bangles and figurines are likely to have been made from locally available raw materials, while the jewellery, standardized weights, and stamp seals were made from raw materials often obtained from distant sources (see Wright 2010, 148–66, 182–203; Law 2011). Raw materials and finished products were both redistributed across a broad region, including settlements outside of the main area occupied by Indus populations, in areas including Central Asia, Pakistani Makran, the Persian Gulf and Mesopotamia (Possehl 2002; Wright 2010, 225–32). This broad distribution is indicative of long-range exchange or trade, but it is unclear how the concomitant network of interaction operated and whether access to particular categories of material was restricted. This last factor resonates with the fact that there is no overt evidence from burials, sculptural traditions, or elite structures for prominent individuals (Possehl 2002, 157–76; Wright 2010, 262–71). It also overlaps with unresolved questions about the nature of Indus elites, whether a ruling class dominated Indus cities, whether there was significant monumental/public architecture in the form of major religious buildings and/or palaces, and whether Indus populations engaged in warfare (e.g. Possehl 1998; Cork 2011; Petrie 2013, 2017; Petrie et al. 2017; see below).

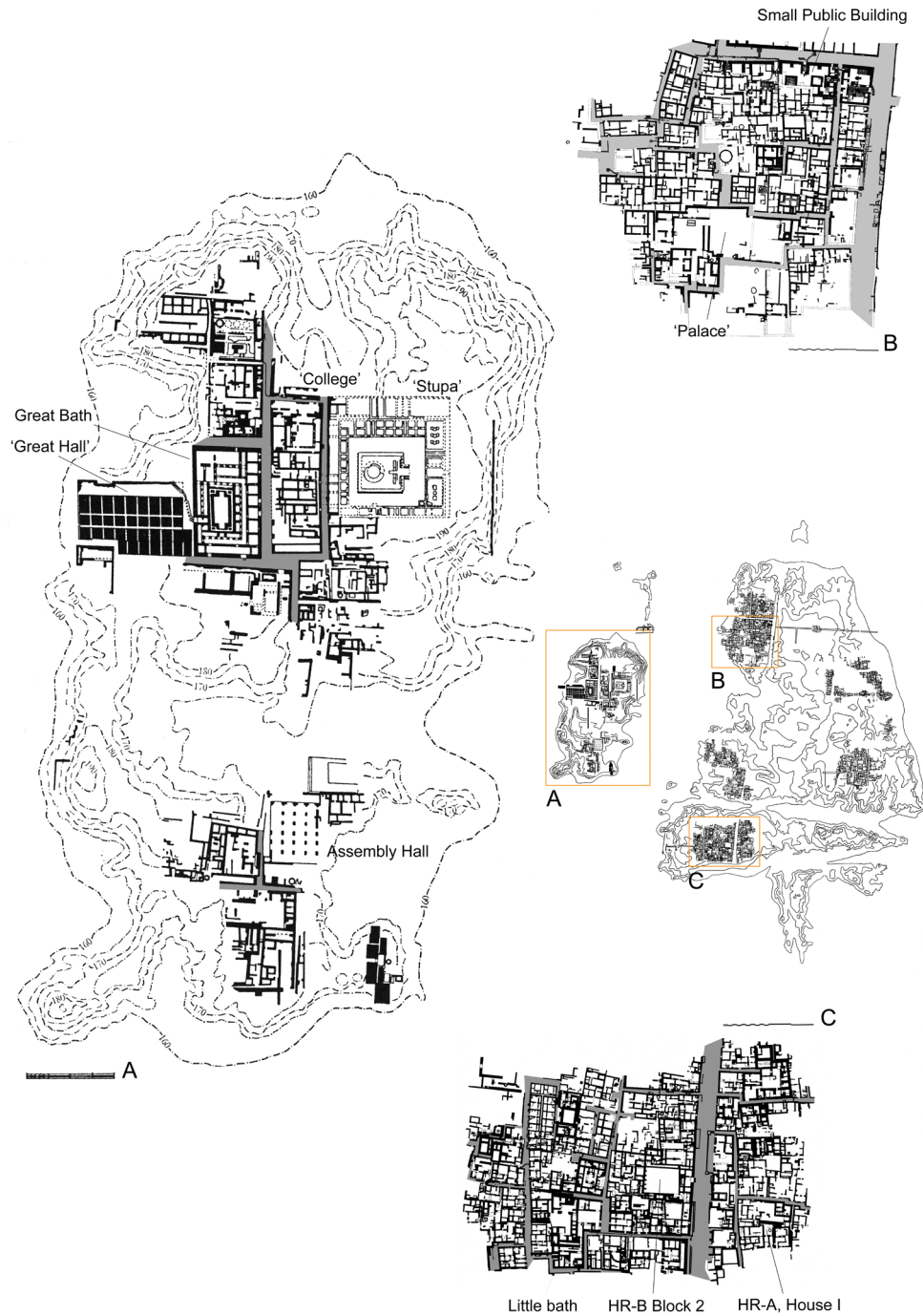
Excavations have been carried out at four of the city sites, and although the work at Dholavira (Bisht 2015) and Rakhigarhi (Nath 2015; Shinde et al. 2013, 2018) has been extensive, only limited information about each of these sites has been published, so they will not be discussed in detail here. Mohenjo-Daro was subject to various periods of large-scale excavation from the 1920s to the 1960s, and detailed reassessment

in the 1980s (Marshall 1931; Mackay 1938; Wheeler 1968; Dales & Kenoyer 1986; Jansen & Urban 1984, 1987; Jansen & Tosi 1988; Possehl 2002). It has been argued that Mohenjo-Daro developed quickly (Jansen 1993), but the date of its foundation and the rate and nature of its growth is debated (Dales & Kenoyer 1986; Kenoyer 2008). Harappa was the first Indus site to be recorded and has been subject to extensive excavations over several phases (Vats 1940; Wheeler 1947; Meadow 1991; Possehl 1991). In contrast to Mohenjo-Daro, the most recent surface surveys and targeted excavations at Harappa have provided evidence for the incremental growth of the city (Kenoyer 2008; Wright 2010). To develop arguments about fragility and robustness, it is important to reiterate some of the salient evidence from each of these two city sites.

Harappa (Fig. 7.1) was a large settlement made up of multiple mounds with enclosure walls, which has a relative sequence of development that indicates progressive urban growth and continual change across three sub-periods (Periods 3A–3C; Kenoyer 1991). Kenoyer (1991, 2007) has suggested that Period 3A saw the establishment of dominant elites on Mound E, Period 3B saw dominance shift to Mound AB at the west of the settlement, and the construction of a ‘Granary’/‘Great Hall’ on Mound F, which is the only large-scale non-residential building that has been exposed. The city reached its maximum extent in Period 3C after 2200 BC (e.g. Kenoyer 2008, 194–7), but this period also shows evidence for dumping in streets and structures (e.g. Meadow & Kenoyer 2005, 221–2), which may indicate overpopulation and erosion of civic control, though we have no idea about political perturbations that might have affected the city. A diverse range of craft activities were carried out at Harappa throughout this sequence, including extractive/reductive crafts such as shell working, stone tool production, seal carving and stone bead manufacture, and transformative crafts such as bangle, figurine and pottery production and copper-based metallurgy (see Wright 2010). There is evidence that extractive/reductive crafts were practised together in distinct locations in each mounded area in the city, while transformative crafts and crafts that bridge these approaches were undertaken in relative isolation, though still within the walled area of the urban settlement (Miller 2007).

Mohenjo-Daro (Fig. 7.1) was primarily comprised of brick platforms topped by fired-brick structures and traces of enclosure walls. The highest mound (Fig. 7.2), which is often referred to as the Mound of the Great Bath, was the locus of a number of unusual buildings that Wright (2010, 117–22) has referred to as non-residential structures. These include the so-called ‘Great Bath’, the ‘Granary’/‘Great Hall’, the ‘College





**Figure 7.2.** Plan of Mohenjo-daro and expanded views of three areas, including: a. Mound of the Great Bath, b. DK-Area, and c. HR-Area. Each of these areas has distinctive large buildings, and all are shown in the same scale (image C.A. Petrie; after Petrie 2013: Fig. 5.1; Possehl 2002: Figs 5.1–5.2).

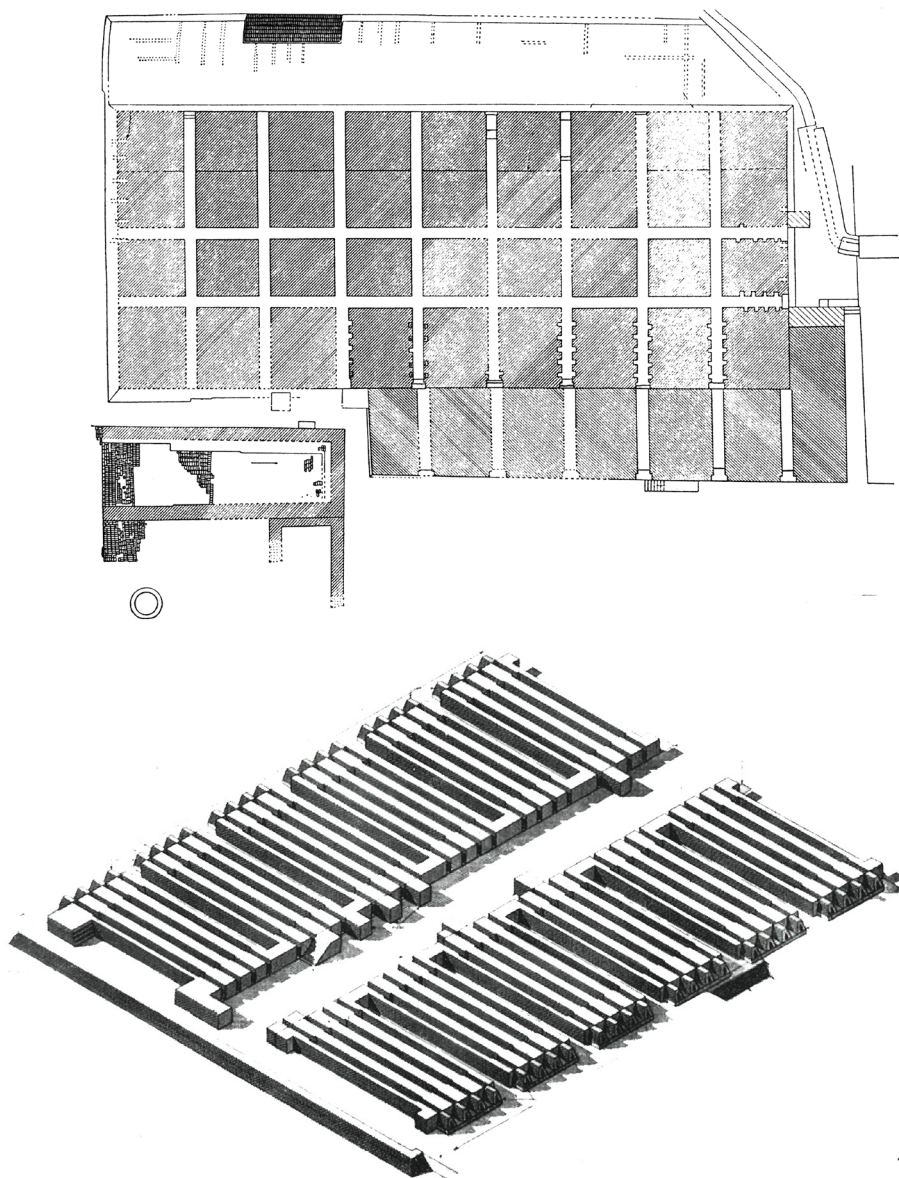
of Priests', the 'Assembly Hall'/'Pillared Hall', and a structure traditionally described as a Buddhist stupa that has long been presumed to date to the Early Historic period (Possehl 2002). The 'Granary'/'Great Hall' at Mohenjo-Daro is often compared to the similarly named structure at Harappa, though the architecture

of each is distinct (e.g. Wheeler 1968, 33–5, 43–4; see Fig. 7.3). A mud-brick fortification or enclosure wall with at least one gateway surrounded at least part of this mound (Fig. 7.2; Wheeler 1968, 40, Pl. VIb, VII, VIIa–b; Alcock 1986, 500–1). Many of the apparently non-residential buildings on the high mound may

have been public and/or elite structures (e.g. Kenoyer 1998, 62–5, 100; Possehl 2002, 193), though it is notable that several contained evidence for craft activities in later phases, including lapidary, shell and leather working (Marshall 1931; Possehl 2002; Vidale 2010, 62).

There has been a speculative reassessment of the so-called Buddhist stupa and associated monastery on the highest mound at Mohenjo-Daro that suggests evidence for Indus religious architecture may not be as elusive as previously thought. The placement and layout of these structures align with the neighbouring Indus period structures, and a reassessment of their architecture, construction techniques, and associated

finds has indicated they may be the remains of substantial Indus period structures that stood at the highest and most visible part of the city (Verardi 1987; Verardi & Barba 2010, 2013; also Wright 2010; Petrie 2013). Other structures are likely to underlie this building (e.g. Kenoyer 1998, 62; though see Possehl 2002, 149), indicating earlier phases of construction. The precise function of this building remains unclear, but Verardi & Barba (2010, 2013) have suggested that it may have been a sacred building with repositories containing discarded votive offerings. The close proximity of the non-‘stupa’ to the Great Bath and the ‘Granary’/‘Great Hall’ suggests that the northern end of this mound may



**Figure 7.3.** Plan of the ‘Great Hall’ at Mohenjo-daro and isometric view of the ‘Great Hall’ at Harappa (image C.A. Petrie; after Wheeler 1963: 9, Plate V).

have been topped by a cluster of important buildings. These buildings appear to have included two structures related to ritual activities, separated by what may have been an elite residence (College of Priests) and flanked by some type of Great Hall. The degree to which any of these ostensibly non-residential structures were public or had access to them was restricted, however, remains unknown.

While the Mound of the Great Bath has long been the locus of suspected non-residential or elite structures, there were unusual buildings on the lower mounds as well. The lower town at Mohenjo-Daro is made up of several distinct sectors and at least two different platforms that were topped with houses of various sizes, workshop areas, and a number of unusual buildings (Fig. 7.2). These structures are enigmatic, but include at least one building that was identified by the original excavator as a palace (DK area, G section, Block 1; Mackay 1938, 46), a building with a unique double staircase that has been described as a possible ritual structure (HR-A, House I; Wheeler 1968, 52–3), and several other buildings that have been proposed as possible temples (Possehl 2002, 149–52; Fig. 2), though these interpretations lack consensus. In addition, Vidale (2010, 64–65, 69–71) has tentatively proposed that Block 2 in HR B area was not comprised of multiple dwellings but was actually a palace or elite residence with an entrance marked by massive columns made from cream or grey limestone 'ring-stones', and also that a small-scale emulation of the Great Bath, a Little Bath, was situated behind it (Fig. 7.2). None of these structures are particularly monumental when compared to the major structures in Mesopotamia and Egypt, and they lack design elements and contents that make their function obvious. The use of the term 'palace' is also loaded, but these new interpretations do suggest that non-residential and substantial residential structures might have been situated in spatially distinct areas of Mohenjo-Daro, which has important implications for our interpretation of Indus civic, socio-economic, and political organization.

The large-scale exposures at Mohenjo-Daro set the model for understanding Indus urban layout by revealing houses arranged in coherent blocks separated by wide main streets, narrow side streets, and alleyways (Possehl 2002), which appear to have persisted over time (Jansen 2010). M.E. Smith (2007) has noted that the structures in the different areas on the lower mounds are arranged in semi-orthogonal blocks that may not have been a result of centralized planning, but were rather the product of the actions of individual builders who made additions to an existing rectangular house or built new houses adjacent to standing structures. Despite the continual rebuilding of the urban fabric,

however, it appears that some form of civic awareness was operating. This view is reinforced by the fact that while many houses at Mohenjo-Daro had their own wells, latrines and bathing facilities, there was an elaborate system that linked houses with drains running along or below lanes and main streets and ultimately off each platform (e.g. Marshall 1931, II.278–82). Several scholars contend that these features indicate that water and its management were critical to the Indus ideology, which Jansen (1989, 1993) has referred to as *wasserluxus* (also Possehl 2002; Agrawal 2007, 139–44). Wright (2010, 122–4) has expanded this line of interpretation by suggesting that these hydraulic structures are evidence of public works, produced by corporate and/or communal activity.

#### *Rural life in the Indus context*

There has been a protracted history of arguments asserting that rural life was a critical element for understanding Indus society, particularly in the work of Fairervis (1967, 1971, 1986) and Possehl (1998; see Petrie et al. 2017; Parikh & Petrie in press). Importantly, these arguments have particular ramifications for our understanding of socio-economic and political organization within and between Indus cities. This is in part because the small-, medium- and large-sized villages and towns that lie in the immediate hinterlands of the large Indus settlements and throughout the extensive intervening regions appear to dominate in terms of the distribution of population (Fairervis 1961; Mughal 1997; Wright 2010; Cork 2011; Petrie 2013, 2017; Sinopoli 2015; Petrie et al. 2017; Parikh & Petrie in press).

A number of what might be described as 'smaller-than-city' (<40 ha) Indus settlements were undoubtedly 'urban' within their local context, and potentially played a crucial role in local administrative and power structures (Petrie 2013; Sinopoli 2015). The site of Kalibangan (c. 11.5 ha), for example, is situated on the southern edge of a dried and probably ephemeral river channel in northern Rajasthan, and was several hundred kilometres from the nearest city-sized settlements at Rakhigarhi and Harappa. During the urban phase, Kalibangan comprised two walled mounds, with the westernmost having two distinctive areas separated by a wall (one being an 'elite residential area', and the other having several brick platforms, which the excavators argued had a ritual function), whereas the eastern mound appears to have been largely residential (Lal et al. 2015). Importantly, Kalibangan presents much of the well-known Indus cultural material, though the local style ceramic types used by the pre-urban population continued to be used for at least part of the later period of occupation, suggesting both continuity alongside the importation, and/or progressive emulation, of non-local



material (Petrie 2013). Similar evidence for the growth of small settlements during the urban period and the use of a mix of the pre-existing local material culture and Indus material is seen at other town and village sites throughout northwest India. For instance, at Farmana, Lohari Ragho I, Masudpur I and Masudpur VII, local cultural material – particularly distinctive pottery and bangles – is numerically dominant, and if ‘Classic’ Indus-style pottery is present, it only occurs in limited quantities (Uesugi 2011; Petrie 2013, 2017; Parikh & Petrie 2016, in press; Petrie et al. 2017, 2018; Ceccarelli & Petrie 2018). Many small sites are likely to have been occupied by farmers (e.g. Lohari Ragho I, Masudpur I and Masudpur VII), but there are also small sites that have clear evidence for specialized production (e.g. beads at Chanhu-Daro, bangles at Ghola Doro/Bagasra; summarized in Parikh & Petrie in press).

The numerous small sites across the Indus Civilization typically have evidence of being occupied in single and occasionally multiple periods (Joshi et al. 1984; Possehl 1999; Kumar 2009; see Petrie et al. 2017). These sites are usually low mounds (e.g. Fairservis 1986), which suggests that occupation was relatively short-lived. Excavations in northwest India have shown that occupation was often discontinuous and not protracted (Petrie et al. 2009, 2016), suggesting that individual settlements may have been abandoned and reoccupied within periods and between periods (Petrie et al. 2017). This type of settlement instability was also characteristic of Pakistani Cholistan, where it is likely that settlement was discontinuous at many individual locations, potentially due to the presence of a braided river system that was susceptible to frequent small-scale avulsions when flooding occurred during monsoon rains (Petrie et al. 2017; Petrie & Lynam in press). Such an environment may have required settled populations to be relatively mobile in order to survive a constantly shifting hydrology. Individual families or kin groups may have needed to spread their members between multiple settlements, and people may have moved between those settlements to access available water in times of shortage or stress. Such practices clearly have implications for our understanding of the sustainability and resilience of rural Indus populations to a diverse and changing environment (Petrie et al. 2017; Petrie 2017; see below).

### Diversity, variability and adaptation in the Indus context

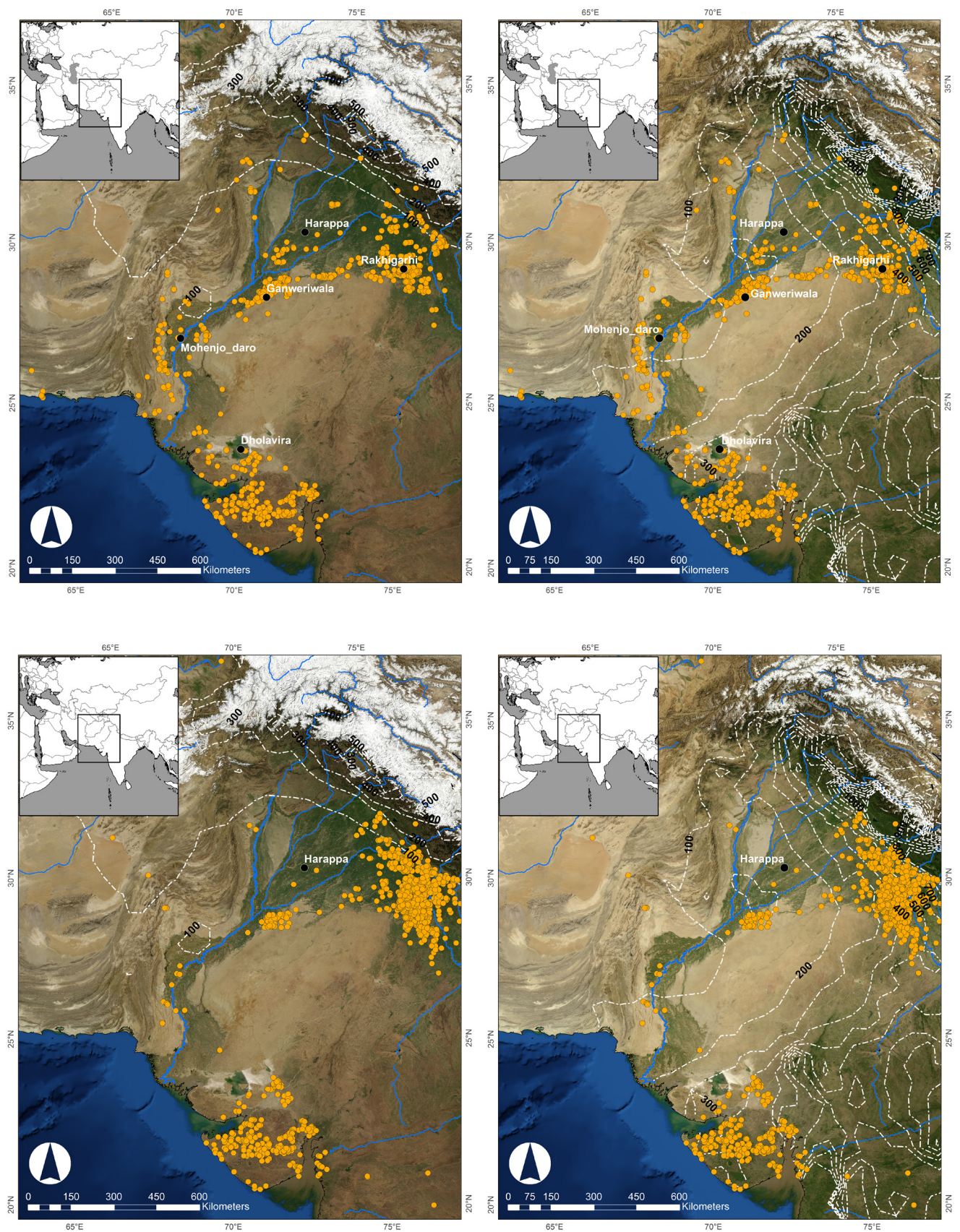
The Indus Civilization has long been described as riverine (e.g. Marshall 1931), but today there is considerable variation in water supply and availability across the extensive areas occupied by Indus populations, which

straddle an environmental threshold where winter and summer rainfall systems overlap. Both rainfall systems have steep gradients and this contributes to diverse and variable climate and hydrology, which in turn impact on environments and ecologies across the entire Indus zone (Agrawal & Sood 1982; Possehl 1982, 1992; Joshi 1984; Chakrabarti 1999, 153–60; Miller 2006; Shinde et al. 2006; Singh & Petrie 2009; Weber et al. 2010; Wright 2010, 166–70; Petrie 2017; Petrie et al. 2017). Comparison of the distribution of known Indus settlements to modern climate zones and season rainfall patterns, suggests that Indus populations inhabited areas of arid hot desert, areas of arid hot steppe, and areas that are warm and temperate with dry winters and hot summers (Petrie et al. 2017; Petrie 2017), though the precise limits of these zones have probably changed since the mid-Holocene (Figs 7.4–7.5). Within this enormous expanse, there are some regions that today receive water via winter rain, summer rain and perennial rivers (e.g. northwest India), while others benefit from only one of these elements, and are thus relatively marginal (e.g. Thomas 2003; Petrie 2017; see Figs 7.4–7.5). While direct rainfall was no doubt important, across the Indus zone there is considerable variation in the timing of rainfall within any year and variation in rainfall intensity between years, and there are sizable areas that today receive less than 300mm of direct winter or also summer rain (Petrie et al. 2017). Heather M-L. Miller (2006, 104–12) has argued that Indus populations likely exploited a diverse range of water sources that were variable in terms of supply, and involved a degree of inherent risk for food security. It is thus probable that hydrological unpredictability was the norm. Miller (2006, 106) also noted that ‘relatively minor changes in the climate system might have a large effect on the amount, timing, and duration of the two rain systems’. Within such a diverse and variable environment, too much or too little rainfall within and between years can have major ramifications, and

**Figure 7.4.** (opposite above) Maps of the Indus River Basin showing the distribution of modern winter (left) and summer (right) across the area occupied by the Indus Civilization, in relation to the distribution of urban period settlements (orange circles), and urban centres (black circles) (image C.A. Petrie).

**Figure 7.5.** (opposite below) Maps of the Indus River Basin showing the distribution of modern winter (left) and summer (right) across the area occupied by the Indus Civilization, in relation to the distribution of post-urban period settlements (orange circles), and urban centres (black circles) (image C.A. Petrie).







borrowing a phrase from Naomi Miller (2011), Petrie et al. (2017) have described the water supply available to Indus populations as being ‘predictably unpredictable’ during the Indus urban period.

Indus farmers were adapted to exploit the diverse environments that they inhabited, making use of varied subsistence practices, involving cattle-, sheep- and goat-based pastoralism and a diverse range of both winter and summer crops (Fairervis 1967, 10, 42; 1971, 169–72, 228–32; Possehl 1982; 1992; Vishnu-Mitre & Savithri 1982; Joshi 1984; Chakrabarti 1988; Weber 1999; Singh et al. 2008; Weber et al. 2010; Petrie et al. 2017; Petrie & Bates 2017). The diversity in Indus agricultural systems reflects the influence of early farming populations from different areas in South Asia who exploited different cultivars (Petrie et al. 2016; Petrie & Bates 2017; see also Fuller 2011; Kingwell-Banham et al. 2015).

Scholars have argued that Indus farmers practised multi-cropping, and that crop diversification increased over time, as suggested by the increased use of summer and or drought tolerant crops (e.g. Vishnu-Mitre & Savithri 1982, 215; Chakrabarti 1988, 96; 1995, 50; Weber 1999; 2003, 181; Madella & Fuller 2006, 1298; Wright 2010, 321). Indus approaches to risk mitigation might thus have included the growing of multiple crops simultaneously on one plot, or using the same land in multiple seasons (Miller 2006, 114), though there are a very broad range of possibilities within the framework of multi-cropping (Petrie & Bates 2017). High-resolution archaeobotanical data from Harappa (Pakistani Punjab; Weber 1999; 2003) and various small village-sized sites in Gujarat (Weber 1991; 1999; Reddy 1997; 2003) suggest that winter crop-dominated and summer crop-dominated strategies were practised in those areas, respectively. The assemblage from Harappa suggests that over time, the major agricultural products of the city were the winter crops wheat and barley, though there is also clear evidence for use of summer millets, and diversification over time, with increased focus on summer and drought-tolerant crops (Weber 1999; 2003; Weber & Kashyap 2016). Data that enable characterizations of the true diversity of practices and the degree to which Indus populations adapted their farming practices to the specific nuances of the local environments are being revealed in northwest India where there is now well-dated evidence from sites in areas that receive markedly different amounts of direct rainfall (e.g. Masudpur VII, Masudpur I, Dabli-vas Chugta, Burj and Bahola) (Bates 2015; Bates et al. 2017a, 2017b, 2017c; Petrie et al. 2016, 2017, 2018; Petrie & Bates 2017). The data from these sites shows that winter or *rabi* and summer or *kharif* cropping were being carried

out before, during, and after the urban period, and that a diverse range of crops were being exploited before an urban centre developed at Rakhigarhi and while it was occupied (Petrie et al. 2016; Petrie 2017; Petrie & Bates 2017). The variation in the cropping strategies between different regions, and at different settlements within specific regions indicates a lack of centralized control over farming practices and potentially also over the type of surplus that was being generated (Petrie & Bates 2017).

We still lack information about the generation, storage and administration of Indus agricultural surpluses, but the diversity and variation in climate, environment, ecology and rainfall must have affected provisioning and storage practices in different parts of the greater Indus zone (Petrie 2017). Although a large proportion of the overall Indus population are likely to have lived in self-sufficient agricultural villages, specific strategies would have been required to feed the urban (and village) inhabitants who were not food producers. It has been assumed that Indus cities were provisioned using a surplus generated by farmers living in their immediate hinterland (e.g. Wright 2010, 127), but this has not yet been demonstrated though co-ordinated investigation of archaeobotanical material from a city and the neighbouring settlements (Petrie 2017). Wright (2010, 205; 2017, 23) has suggested that there is evidence at Harappa for crop processing before storage, which is possibly indicative of communal or even centralized production, but the primary data remains unpublished. Wright (2010, 127) has also argued that the products of farmers and herders were necessary to sustain city-based specialists, but the degree to which cities might have been fed by surpluses generated by city-based farmers as opposed to those generated by village-based farmers in the rural hinterland remains unknown. It was initially argued that granaries existed at both Mohenjo-Daro and Harappa (e.g. Marshall 1926/1927; Fig. 3), but the structures concerned have produced no overt evidence for grain storage, and they are now typically described as Warehouses or Great Halls of unknown function (e.g. Possehl 2002, 66–7, 103–4, 191–2; Meadow & Kenoyer 2005, 96–101). In contrast to the lack of large or more formal storage facilities, pits are common at Indus settlements and some also have evidence for stone lined bins (e.g. Rojdi; Possehl & Raval 1989; Weber 1991). Petrie et al. (2016) have suggested that populations living in areas where winter or summer monsoonal rain was not available are more likely to have needed more substantial and perhaps more centrally organized storage facilities to ensure the availability of cereals year-round. In contrast, populations living in regions that received

water from both rainfall systems are likely to have had access to a more regular food supply, and potentially had different storage requirements (Petrie et al. 2016), though some storage throughout the year remains likely. Furthermore, there is likely to have been considerable variation in what crops were grown and how they were grown within these areas, as farmers may have been in a position to make responsive choices (cf. Miller 2015), unless of course there were restrictions on choice, as suggested by Madella (2014, 227–29; also Miller 2015). The potential for flexibility may explain why particular crops or combinations of crops appear to be dominant in some settlements, but not in others (Petrie & Bates 2017). It is also important to consider the possibility that surplus food products might have been exchanged *between* populations living in different regions (Madella 2014; Miller 2015; Petrie et al. 2016), which may be demonstrated in the future through strontium isotope analysis (Petrie 2017). The diversity of the environments in which Indus populations lived, and the discussion of surplus generation, provisioning and storage all have implications for our understanding of socio-economic control structures both within cities, between cities and their hinterlands, and between populations across the Indus Civilization.

There is more to diversity of practices than farming and agriculture of course. The Indus urban period was characterized by the appearance of specific categories of cultural material at each of the urban sites and many of the settlements in the intervening regions (e.g. carved steatite seals, cubical weights, bangles, and beads). Finished goods were also widely exchanged and traded within the Indus zone, and while this material is found distributed in the surrounding areas, there are only relatively limited quantities of 'foreign' finished goods being found in the Indus region (Possehl 2002; also Ratnagar 2001), and the uniformity of Indus material has been used to support arguments for long distance integration across the Indus Civilization (e.g. Kenoyer 2006, 55, 62; Wright 2010, 23, 326–30). While the populations living in the various regions were clearly interacting with each other, and sharing aspects of technology, material, ideas and ideology, it is becoming increasingly clear, however, that the indications of material uniformity across the Indus Civilization mask the degree of regional diversity in material and practices (Wright 2010; Petrie et al. 2017). Several scholars have suggested that the widespread attestation of certain categories of material is potentially a 'veneer' spread by a network of interaction that overlies considerable regional diversity (Meadow & Kenoyer 1997; Clark 2003; Petrie 2013; Chase et al. 2014; Petrie et al. 2017, 2018).

### **Mediation of politics and power *within* Indus settlements: hierarchy, heterarchy and collective action**

Trigger (2003, 73) argued that it 'seems reasonable to conclude that all early civilizations probably had monarchs, even if kingship was defined somewhat differently and the actual political power exercised by such rulers varied considerably from one to another'. As the Indus Civilization presents no obvious evidence for one or even multiple rulers, it may have been an exception. Indus cities and larger settlements appear to have been polycentric, being made up of multiple mounded areas raised on mud-brick platforms and/or surrounded by walls; and having large buildings (residential and non-residential) in multiple locations, which may each have been foci of wealth and/or power (Petrie 2013). This concept fits with suggestions that access to different areas within cities was restricted through walls and gates (Kenoyer 1994; Eltsov 2008) and the delineation of space was important (cf. Eltsov 2008). It is also reinforced by the clear spatial distribution of different craft activities at Mohenjo-Daro (Bondioli et al. 1984; Pracchia et al. 1985; Vidale 1990, 2010) and Harappa (Miller 2007, 40–4). The evidence for the constriction of movement and the distribution of large structures in various sectors has led to the suggestion that Indus urban populations were largely heterarchical, and dominated by groups that were broadly equal in terms of socio-economic status, competed with one another, but lived in socio-economically segregated areas (Kenoyer 1991; 1994; 2006; Possehl 2002, 57; Eltsov 2008; Petrie 2013). Whether these dominant groups were elites, and precisely how they wielded power is, however, debated, and there is not a consensus about Indus socio-economic and political structure. A number of scholars have, however, written along similar lines.

Possehl (2002, 57) suggested that the Indus Civilization showed signs of heterarchical structures through evidence of corporate action, perhaps under a series of 'councils' or gatherings of leaders. Kenoyer (2006, 2008) has proposed that the formal division of space and the distribution of workshops at Harappa indicate that there was competition between elites, merchants, landowners or religious leaders within each sector, and between sectors. He has described this as a decentralized system of corporate rule similar to that seen in the Early Historic period in the subcontinent (Kenoyer 2008, 195; also 1997, 2006), though clearly advocates the existence of an overarching hierarchy of wealth and legitimacy (Kenoyer 2000, 2006). For Eltsov (2008), the creation of three-dimensional and segregated worlds with restricted access and hidden monumentality



was an ideological choice that served to demarcate groupings, be they social, religious or professional. Wright (2010, 332; 2016, 234–7) has written of vertical integration and local councils, but also of evidence of heterarchy and collective action. Vidale (2010) has argued that the presence of a palace and associated Little Bath in the HR area at Mohenjo-Daro signals the existence of a social structure where each sector of the lower town was the preserve of a group or groups of elites that were socially, economically, and politically capable of building palaces and ritual structures that emulated and competed with those seen on the Mound of the Great Bath. Sinopoli et al. (2015, 388) have made the nuanced suggestion that power in Indus cities may have been variously distributed among competing and fluid social or economic groups rather than being highly centralized under a single ruling dynasty. They also suggest that political and religious ideologies might have discouraged the materialization of extant hierarchies, thereby maintaining a non-hierarchical political structure (Sinopoli et al. 2015, 388–9). Yoffee (2016, 1062) has built on this interpretation to suggest that Indus cities were ruled by oligarchies.

Taken together, these views suggest that no one elite group dominated any of the Indus cities in a strictly hierarchical fashion. Rather, the polycentric Indus cities may have been dominated by several groups that were potentially elite and broadly equal in term of socio-economic status, but who competed with each other and used mechanisms to limit concentrated power. This pattern may well hold for the smaller centres and towns as well, where segregation within individual settlements is often evident (Petrie 2013). There almost certainly were other social and economic groups within any individual Indus population that were also organized heterarchically, including various types of crafts people, labourers and farmers. Wright (2016, 235–6) has argued that pottery production required a cooperative network of craft workers, who engaged in consensus building and collective action. Thus, while heterarchical structures appear to have been predominant at various levels of Indus society, they likely co-existed with various types of vertical structures (Wright 2016, 226; *cf.* Crumley 1995).

In seeming contrast to the arguments about social and physical structures of spatial differentiation and exclusion lie suggestions that many of the large structures at Mohenjo-Daro that are cognate with Wright's (2010, 117–22) non-residential structures, may have served some sort of 'public' function (e.g. Ratnagar 1991; Kenoyer 1998, 62–5, 100; Possehl 2002, 193; Shinde 2016). The ways in which many of these buildings were used remains unclear, but in some instances, specific functions of 'public' buildings have been discussed. The

most obvious example is the 'Assembly Hall'/'Pillared Hall' in L-area on the Mound of the Great Bath (Marshall 1931, 21–2; Wheeler 1968, 46), which has been described as a market (Mackay 1948), though this suggestion is based entirely on architectural form (Possehl 2002, 194–5). Mackay (1938, 76) also suggested that the structures at an intersection DK-G area - Block 8A and Block 6A - were administrative buildings, and may have had spaces for 'public letter-writers' (Fig. 2). Green (2018) has noted that these structures have a high density of stamp seals, and argued that they were a unified complex providing specialized spaces facilitating community or civic level interaction. He has referred to this particular building as a small public structure and suggests that in such contexts, interaction could take place across social boundaries, and between households, kinship groups, etc., and argued that such buildings were necessitated by the heterarchical urban context (Green 2018). The prospect that there were both small and large public buildings distributed in different parts of Mohenjo-Daro opens up a range of possibilities for speculating about who had access to each structure, and whether both types of buildings made it possible for individuals and groups to interact across social boundaries, as Green (2018) surmises for his small public structure in DK-G. Some non-residential structures may have been exclusive in terms of function and access, while others may have been truly public, and the differentiation of such will be fruitful for further research.

There are other factors that provide indications about the nature of Indus social structures and social interaction. From the construction of platforms, walls, buildings and elaborate waste management and drainage systems, down to the manufacture of pottery and the use of seals for individual transactions, it is likely that there was corporate/communal activities and also collective action in operation. As noted above, Wright (2010, 122, 124) has described the elaborate water supply, washing and drainage infrastructure seen at Mohenjo-Daro and Harappa as 'public works', with the implication that they are the product of corporate action for community benefit. Analysis of several of the major walls at Harappa has shown that bricks were made using different coloured clay, implying that they came from different sources, but also that bricks of different colours are present in the same wall (Meadow & Kenoyer 1994, 457–8; 2005, 221). This pattern suggests that there was not a simple correspondence between the bricks produced using one source of materials and the destination where they were used, and Meadow & Kenoyer (1994, 458) have suggested that individual groups were not responsible for the materials and labour required to complete individual segments of

wall. It is not clear whether each enclosure wall or platform was the product of the communal activity of the population of that particular area of the settlement, or whether cooperation took place at a broader city wide or supra-city scale. Similar questions could be asked about the construction and maintenance of other buildings, including the speculated palaces and religious buildings, as such structures might have been constructed under central management, under the aegis of individual sectors, or by specialists in construction able to work across the social and physical boundaries of the city. Some of these activities may have been taking place exclusive of influence from elites.

Despite the existence of separate walled areas and putative religious and palatial structures, other evidence for socio-economic differentiation is limited in the Indus context, and this poses interpretative challenges. There are indications of some variation in the size and degrees of elaboration in houses (Marshall 1931; Possehl 2002; Wright 2010, 117; Cork 2011, 38–47), which has been enhanced by the reinterpretation of the HR-A building (*cf.* Vidale 2010). Kenoyer (1989, 2000) has suggested that bangles provide evidence for socio-economic differentiation, as they were produced using a range of raw materials (e.g. clay, shell) using technologies that show various degrees of elaboration (e.g. faience, stone ware). There also appears to have been some differential access to finished products, including beads and metal artefacts (e.g. Vidale 2000; Vidale & Miller 2000; Wright 2010, 246–62). Importantly, however, disparity is not clearly reflected in the relatively limited number of burials excavated at sites including Harappa, Rakhigarhi, Lothal, Rupar, Kalibangan and Farmana. In each instance, individual graves are broadly similar in containing distinctive types of pottery vessels and small numbers of personal ornaments, such as bangles and beads (Shinde et al. 2009; Wright 2010, 263–70; Valentine et al. 2015; Lal et al. 2015; Kenoyer & Meadow 2016; Valentine 2016; Shinde et al. 2018). Being cognisant of the similarities in burial form, Kenoyer (2006, 67; Valentine et al. 2013) has suggested that the small size of the known cemeteries indicate that only certain social groups practised burial. Wright (2010, 270) has noted that only two burials have evidence for higher status, one at Harappa (Kenoyer 1998, 124), and one at Kalibangan (Sharma 1999, 87), and speculated that each might have contained the head of lineages interred in the related cemeteries. In contrast to the other evidence, there are six or more large tumuli at Dholavira, one of which had a chamber containing unusual pottery and gold objects (Bisht 2015, 658), and a range of elaborate grave goods have been revealed in the post-urban/Late Harappan cemetery at Sanauli (Sharma et al. 2007; Prabhakar

2013). These findings suggest that there may actually have been regional variation and the delineation of elites through differences in burial style and grave objects in some areas (Kenoyer & Meadow 2016, 164).

We are thus left with an interpretative tension between the desire to identify socio-economic hierarchies at Indus settlements, and the manifest evidence for various heterarchical arrangements. The nature of many of the large non-residential buildings, for example, may indicate the existence of some form of socio-economic hierarchy within Indus settlements, but it was not manifested in the way seen in Mesopotamia and Egypt. It is also likely that there were various types of heterarchy within Indus socio-political life, be it between competing elites, religious specialists, merchants, traders, and/or landowners, or between crafts people, labourers, farmers and others pursuing more quotidian trades. Wright (2016) and Green (2018) have both referred to the evidence for more horizontal socio-economic organization seen at Jenne-jeno in the ancient Middle Niger (*cf.* McIntosh 2005) as a potential parallel to the Indus example, highlighting the importance of considering the resistance to centralization. Ratnagar (2016, 113–29) has drawn attention to the example of the Yoruba, which is further down the Niger, and highlighted the potential importance of the types of dynamics that occur when kin groups, clans, lineages or tribes live together. While these proposals contain considerable potential, we do not yet know enough about the specific distribution of social groups within Indus settlements, and are at present largely assuming that distinct groups were all living in what appear to be segregated areas within urban centres. It thus remains unclear whether the physical separation was driven by socio-economics, ideology or other factors.

### **Mediation of politics and power *between* Indus settlements: the Indus state debate**

The lack of clear consensus about the nature of socio-economic and political organization *within* urban centres carries over into interpretation of the socio-economic and political relationships *between* cities and across the Indus Civilization as a whole. Scholars have advocated a range of suggestions about the nature of large-scale control structures, including the argument that the Indus Civilization was a non-state (Fairervis 1961, 1967; Malik 1968; Shaffer 1982; Possehl 1998), that it comprised 'city-states' (Kenoyer 1994, 1997, 2006; Chakrabarti 1999; Wright 2010; also Sinopoli 2015; Yoffee 2015, 5), and even that it was some form of empire (Ratnagar 1991, 170; Dhavalikar 1995; Allchin & Allchin 1997).

Following Fairservis (1961, 1967, 1992; Malik 1968, Shaffer 1982), Possehl (1998, 282–3) argued that the Indus Civilization was a hegemony of chiefdoms, and that the cities were the seats of the chiefs that ‘had the character of super villages, more complex than villages but not like Ur, Uruk or Nippur, which were centres of vast political power with large temple complexes dedicated to their civic deity’. Such interpretations obviously have implications for the nature of control structures within cities, and the extent to which control extended into the surrounding hinterland. Possehl (2002, 6) noted that ‘kings are hard to find in the Indus Valley cities; nor are there palaces, bureaucracies, or ‘other trappings of “stateness”’, but Yoffee (2005, 228–9) noted that Possehl describes ‘Indus cities, social and economic differentiation, large public ceremonial areas with very large buildings and monuments, record keeping of various sorts, and the restructuring of the countryside around politically independent cities that share a common ideology.’ The key point that Yoffee (2005, 229) makes in relation to Indus control is in fact the key point of his book *Myths of the Archaic State* – there was no *one* form of archaic state. He explicitly notes that ‘Indus Valley city-states look different from Mesopotamian city-states. They were ruled differently and seem to have had different rules about how power was to be exhibited in them and, presumably, about how power was to be contested’ (Yoffee 2005, 229), and this is still valid.

Jacobsen (1986) and others have suggested that the Indus Civilization presents the political and administrative framework of a state (e.g. Chakrabarti 1995, 122–3, 1999, 199–200; Lal 1997, 236–8). Kenoyer (1994, 1997, 54; Wright 2010, 333), has previously speculated that the geographical extent of putative Indus city-states – whose capitals were the large-scale urban centres – ranged from 100,000 to 170,000 sq. km in area, implying that individual cities controlled vast hinterlands. However, these areas are far larger than the site sustaining areas needed to support a city, and areas of direct control are likely to have been much smaller. This likelihood makes it possible that medium and large sized town settlements operated as independent centres of regional power and administration (Petrie 2013; Sinopoli 2015; Petrie et al. 2017; Petrie 2017). In the absence of evidence that there was a hierarchy of cities, it appears that each of the Indus cities was an independent polity, and the smaller urban centres might have been subordinate to the larger cities or polities in their own right.

The production, exchange, and use of similar material in the cities and smaller urban centres and the similar spatial delineation of settlements into separate enclaves suggests that urban populations may have

been emulating each other both within and between settlements (Petrie 2013). Although it was created to explain a very different cultural context, at a certain level, these factors all conform to Renfrew’s (1986) model of peer-polity interaction, where the interaction between autonomous socio-political units is more significant than external links with other areas, and processes of transformation are brought about as a result of interaction between peer-polities in the form of competition (including warfare), competitive emulation, symbolic entrainment, the transmission of innovation, and increased flow in the exchange of goods (Petrie 2013). The element of this definition that does not accord neatly with common perceptions of the Indus cities is the role of warfare, but Cork (2011) has pointed out that evidence for warfare is particularly rare in ancient societies, and a range of Indus material may actually have been weaponry (Cork 2005). I have suggested that a major difference between the Indus Civilization and other contemporaneous societies is in the representation of violence, which could be related to both ideology and the distance between centres (Petrie 2013, 95). Although workable, the model of peer polity interaction is not neatly suited to the Indus case, and the suggestion that there were heterarchical relationships between the Indus urban centres may be more fruitful (Petrie 2013).

### ‘Crisis, what crisis?; the 4.2 kya event and the Indus

The beginnings of a change in the Indus urban sphere began at the end of the third millennium BC, such that by c. 1900 BC different social, economic and political structures were in place (Petrie 2017). Analysis of the networks of raw material acquisition and redistribution suggest that the final phase of the urban period (late Mature Harappan/Harappa 3C phase; c. 2200–1900 BC) was one of more intensive interaction (Law 2011, 466–7, Fig. 13.6). It was also apparently the period when Harappa was most densely occupied (Kenoyer 1991, 57; 2008), and the ‘Later’ phase of its Great Hall appears to have been (re-)built around 2200 BC (late Period 3B/early Period 3C) (Meadow & Kenoyer 2005, 99–101). However, it is notable that starting perhaps as early as c. 2200 BC, major structures at Mohenjo-Daro, including the Great Bath, fell out of use, and the settlement became progressively depopulated (Possehl 1997a, 215–17; 1997b, 458; Wright 2010). It is possible that the phase of intensive interaction, increased urban density and construction activity is indicative of population stress that put pressures on food production and supply chains (*cf.* Pande & Ersten 2014, 1753). The likelihood that changes were taking place is emphasized by the fact



that by c. 1900 BC, there appears to have been a reduction and reorientation of settlement in the entire Indus region. The largest settlements in Sindh and Cholistan had been abandoned or reduced in size and almost all others were displaced, whereas in Gujarat, Haryana and Indian Punjab it appears that several large-scale settlements were abandoned, and there was an increase in the number of small-scale settlements (Joshi et al. 1984; Mughal 1997, 51–2; Possehl 1997b, 460, Table VII; 2002, 212, 241, Table 13.2; Petrie et al. 2017; Green & Petrie 2018). The networks of raw material acquisition and the range of material being moved also reduced in this post-urban phase (Law 2011, 468, Fig. 13.7).

There is consensus that there was an increase in settlement numbers and density in northwest India in the posturban/Late Harappan period. However, reassessment of older data and new surveys and by the *Land, Water and Settlement* and *TwoRains* projects have shown no increase in the number of village-sized settlements in the central part of the plains during the post-urban phase, implying that there was no substantial increase in the local population in some areas (Singh et al. 2010, 2011; Petrie et al. 2017; Green & Petrie 2018). This observation suggests that the perceived intensification of village settlement post-urban/Late Harappan period in northwest India was concentrated in the areas that are warm and temperate, with dry winters and hot summers that lie along the Himalayan front and at the eastern edge of the plains (Petrie et al. 2017; Green & Petrie 2018).

The one large-scale settlement that continued to be occupied throughout the later Mature Harappan and into the Late Harappan period was Harappa (Petrie 2017). However, analysis of pathologies visible on skeletons from Cemeteries R37 and H, which span this protracted period of transition, has revealed evidence for increasing physical and social stress. Leprosy is attested in the urban period, but the Late Harappan skeletal remains have evidence for increased violence and disease, including cranial and post-cranial trauma, and various infections and diseases, including leprosy and tuberculosis (Lovell 1994; 1997; Robbins Schug et al. 2013a; 2013b; Robbins Schug & Blevins 2016).

Reduction in the density and scale of urban populations appears to be accompanied by the loss of many of the elaborate crafts and their concomitant technical virtuosity (Vidale & Miller 2000, 151–3; Wright 2010, 312–24). The distinctively decorated pottery and bangles of various types continued to be produced during the post-urban period, but the production of items such as long carnelian beads, standardized weights, and inscribed and decorated seals all ceased, as did the use of Indus signs (Possehl 1997b, 460–4; Kenoyer 2006; Wright 2010, 322). This phase also saw

the cessation of long-range trading with the Persian Gulf and Mesopotamia (Cleuziou & Tosi 2007; Wright 2010, 314). After the depopulation of the Indus cities, there appears to have been no large-scale settlements within the regions occupied by Indus populations for up to one thousand years.

A range of natural and human-induced causes have been put forward to explain this overarching process of change and transformation, with the former including factors like declining rainfall, desiccation, and river shift, and the latter including factors like invasion, reorientation of long-range trade, resource exhaustion, social evolution, population increases and responses to natural change (Allchin 1995; Possehl 1997a; 1997b; Wright 2010, 312–14). While invasion theories are now largely discounted, the new potentials of human genetic analysis have meant that they are still being explored (e.g. Narasimhan et al. 2018). More fruitfully, the investigation of the environments inhabited by Indus populations, and changes to those environments has seen ongoing research by a range of projects (reviewed in Petrie et al. 2017). There is also only limited proxy evidence for ancient climate that is proximate to the Indus zone and can thus be keyed into the available archaeological datasets (Petrie et al. 2017). Inferences that assume climate was a driver of culture change tend to look from the 'top-down', and end up in 'correlation equals causation' circularity. It is arguable that an understanding of the transformation of the Indus Civilization can only come from 'bottom-up' consideration of evidence of local climatic and environmental conditions, and human adaptation, sustainability and resilience to both those conditions and changes in those conditions (e.g. Madella & Fuller 2006; Miller et al. eds. 2011; Dixit et al. 2014; Petrie et al. 2017; cf. Aimers & Hodel 2011). Furthermore, to ensure that the impact of climate and climate change on human behaviour is not over-emphasized, it is also essential to consider if and how the interactions between human and the environment intersect with other social, economic and political dynamics.

The theme of water-related crisis has long been core to many narratives of Indus 'collapse', and arguments have been made for (and against) the impact of both flooding and river shift/drying, with the latter potentially being caused either by neo-tectonic processes, or climate change (Ghose et al. 1979; Yashpal et al. 1980; Mughal 1997; Lal 2002; Valdiya 2002; Shinde et al. 2006; Danino 2010; reviewed in Petrie 2017). There have now been several attempts to date the flow of perennial water through various paleochannels within the Indus River basin, and to link this process to urban transformation. There is growing consensus that at least one major paleochannel ceased to be a

perennial watercourse before the Holocene (Saini et al. 2009; Lawler 2011, 23; Clift et al. 2012; Giosan et al. 2012; A. Singh et al. 2017), but there is some evidence of ephemeral water flow through some channels at different points during the mid-Holocene (Clift et al. 2012; Giosan et al. 2012; Maemoku et al. 2012; Saini et al. 2009; Shitaoka et al. 2012; Durcan et al. 2017). It is extremely likely, however, that many if not all of the explanations that have been put forward to explain the processes of hydrological evolution and change in northwest India, and their relationship to Indus populations, are either not complex enough, or do not consider the full hydrological complexity of the region (Orengo & Petrie 2017, 2018).

Across greater Western and South Asia there is relatively limited climate evidence that relates specifically to the period in which the Indus cities were occupied (*c.* 2500–1900 BC). There is, however, a range of evidence for a major climate ‘event’ at *c.* 4.2–4.1 ky BP or *c.* 2200–2100 BC, which appears to be related to a cooling event in the North Atlantic (Bond Event 3; Bond et al. 1997), shifts in the Inter-Tropical Convergence Zone, and marked weakening of the Indian Summer Monsoon (Weiss et al. 1993; deMenocal 2001; Staubwasser et al. 2003; Clift & Plumb 2008, 196–216; Cronin 2010, 235–6). It has been argued that this particular event had a major socio-economic impact in Mesopotamia and Egypt (Weiss et al. 1993; deMenocal 2001; Staubwasser & Weiss 2006; Weiss 2017), and its broad chronological correlation with the onset of Indus de-urbanization has also been noted (Staubwasser et al. 2003; Staubwasser & Weiss 2006; Dixit et al. 2014). It is evident, however, that there was variation in its timing, duration, and impact, with some areas showing acute effect (e.g. Middle East, Arabian Peninsula, Red Sea), while others apparently were little affected (e.g. northern Europe) (e.g. Roland et al. 2014). There is evidence for climate and climate change from within the Indus zone from Lake Kotla Dahar in Haryana, India, which shows that the marked weakening of the ISM affected NW India at *c.*  $4.1 \pm 100$  ky BP/*c.*  $2100 \pm 100$  BC (Dixit et al. 2014). While this record demonstrates that the weakened ISM had a direct impact upon one of the regions occupied by Indus populations, it is not yet clear how this shift affected other regions, and more climate records that increase spatial resolution are needed (Petrie et al. 2017). New analysis of samples from a sediment core close to the mouth of the Indus (63KA) has shown that the weakening of the ISM was preceded by a weakening of the Indian Winter Monsoon (IWM) after a period of peak strength (Giesche et al. 2019). This finding supports the suggestion that the so-called 4.2 ka BP event was a complex phenomenon that potentially involved a range of weather dynamics

that effected regions differentially. The impact on both the ISM and IWM *c.* 4.3/4.2 ka BP potentially had a profound effect on the Indus Civilization.

Weakening monsoon strength (winter and summer) after *c.* 2300–2200 BC does correlate broadly with both the maximum extent of occupation at Mohenjo-Daro and Harappa and the onset of Indus urban decline, though it is clear that this was a variable process (e.g. Wright 2010, 43; Petrie 2017). The chronological correlation between the data sets is, however, imprecise due to the limitations of radiocarbon dating techniques in terms of precision (Dixit et al. 2014; Staubwasser & Weiss 2006). Monsoon weakening in some areas is only part of the story, and consideration of human responses is critical. For example, it has been suggested that decline in monsoon strength led to the diversification of the Indus crop assemblage through the adoption or intensified use of more summer and drought resistant crops such as millet and also rice (Madella & Fuller 2006, 1298; Giosan et al. 2012; Wright 2010:321ff.). Madella & Fuller (2006, 1298; also Fuller 2003; Madella 2014, 229) have hypothesized that the shift toward drought-tolerant rain-fed crop species that produce lower yield per unit area would have resulted in there being less surplus available to provision larger centres. They also suggested that the cultivation of such crops may have encouraged larger numbers of smaller communities, and that ‘the strategic shifts by farmers to other crops may have contributed to the decline of the economic foundations of Harappan urbanism’ (Madella & Fuller 2006, 1298). The evidence for the exploitation of a diverse range of crops before, during and after the urban phase from Masudpur VII and Masudpur I encourages a recalibration of these hypotheses (Petrie et al. 2016, 2017; Bates et al. 2017a, 2017b, 2017c; Petrie & Bates 2017). Wholesale changes in the efficiency of yield production may not have been an integral part of the de-urbanization trajectory, which has important implications for discussions of fragility and resilience. However, until we have archaeobotanical evidence from the neighbouring urban site of Rakhigarhi itself, or material from settlements in the hinterland of Harappa, it won’t be possible to fully reconstruct the structure of provisioning in urban sites and their hinterlands (Petrie 2017).

Petrie et al. (2017; Petrie 2017) have suggested that the weakening of the ISM around *c.* 2200–2100 BC meant that the climate in the subsequent period became ‘unpredictably unpredictable’. By this we meant that before and during the Indus urban phase, populations were familiar with ‘predictable unpredictable’ conditions and their farming strategies were tailored to make use of water supplied by combinations of rainfall, inundation, small-scale irrigation and/or

lifted water (*cf.* Miller 2006). Populations in specific areas across the Indus zone might have been able to survive one, two, or even more years of drought, either through reliance on their own resources, or through support from other regions. However, when this range was exceeded, such as when populations were faced with protracted periods of drought, the local and medium-to-long range provisioning and support networks may not have been able to sustain the status quo. I have suggested that in such a situation, farmers may have had to engage in constant risk mitigation, thereby reducing opportunities to produce surpluses, and in such situations it is possible that living in large groups (i.e. urban centres) was not an option (Petrie 2017; see below).

A prolonged weakening of the Indian Summer Monsoon would almost certainly have had a dramatic impact upon water availability in the Indus River basin, but this impact would not have been consistent across this environmentally diverse zone. There are, however, clearly significant limitations in the core body of evidence that inform understanding of Indus de-urbanization, particularly in terms of spatial and chronological coverage, and the impact of environmental and climatic factors. Nonetheless, we should speculate about how changes to the climate system of anything more than short duration are likely to have had an impact upon food security and resilience of urban and other populations across this diverse region.

### Urban 'stability and fragility' and rural 'resilience'

The Indus Civilization does not fit neatly into a narrative of extreme fragility (*cf.* Yoffee, 552ff; 2016, 1061; also Scott 2017), primarily because of the longevity of its urban centres, which have to cope with environmental variability and chance, and resist 'collapse' for an extended period. I have attempted to highlight how the relative invisibility of prominent leaders, the lack of translatable texts that might provide some succour, and the lack of consensus about how urban centres and the Indus Civilization as a whole were socio-economically and politically organized create practical and interpretive challenges. However, I have also argued that the exploration of the dynamics of fragility, robustness, resilience and sustainability in the Indus context as outlined here provide a way of exploring fragility in a distinctive fashion.

It is important to consider whether we are discussing fragile states or fragile cities. Yoffee (2015, 552; 2016, 1056, 1061; this volume) has made it clear that there was a contrast between infrastructural (state) power and the heterarchically structured underpinnings of Mesopotamian society. In the Mesopotamian

example at least, it is arguable that it is the state-level structures and the power of individual kings and their courts (Yoffee's 'infrastructural power') that is the most fragile component, and not the city itself (Yoffee this volume). While there are examples of cities that disappear with their ruler and or dynasty (e.g. Agade, Ur III period Ur, Dur Sharrukkin), there are many other cities that were occupied for thousands of years (e.g. Uruk), and cities may continue to exist without political power (Yoffee 2016, 1060, this volume). This distinction between the political fragility of the state and capital cities, and the relative longevity of 'other' cities is important when it comes to the Indus case, with its lack evidence for kings, queens and courts.

Although a range of political changes across a period of up to 700 years is inevitable, Middleton's (2017, 93) point that for the Indus Civilization these changes 'are not visible to us as they are in some other societies' continues to hold. Without clearer understanding of Indus socio-economic and political structures, and the information documented in the Indus sign system and its associated administrative systems of stamp seals and standardized weights, we can only speculate about political dynamics. It is arguable that the lack of evidence for political change may indicate that Indus cities were robust rather than fragile.

In his paper prepared for the workshop, Robertshaw asked, 'Is apparent "stability" (for several centuries) in some early states a result of constant adjustments and accommodations with internal and external forces?' (see Yoffee this volume; Stark this volume). In the Indus context, the lack of hierarchical political leaders may have facilitated constant adjustments and accommodations taking place via civic councils and/or Green's (2018) specialized spaces for community or civic level interaction. This factor is potentially very important for discussions of fragility in the Indus context. Early interpretations suggested that the Indus Civilization was unchanging and, in many ways, dull (e.g. Wheeler 1950, 28–9), and there is an ongoing narrative that argues that the Indus Civilization is part of a grand and long-term Indus Tradition that is fundamentally linked to the later Early Historic phase of urbanism (e.g. Kenoyer 2006). However, I argue that the Indus Civilization was marked by relatively constant adaptation, change and transformation at various scales, with the Indus cities seeing repeated phases of expansion and development, and the building, rebuilding and remodelling of walls, platforms, non-residential and residential buildings. Across periods and also within the urban period, there appears to have been instances of settlement displacement, which implies the need for



and facility with adaptability. This is in keeping with the suggestion that Indus populations were adapted to living in a predictably unpredictable diverse and variable environmental context. Their ability to be adaptive appears to have made them robust. However, from *c.* 2100 BC, there is clear evidence for the beginning of more profound processes of transformation that appear to have contributed to Indus de-urbanization, with the environmental context potentially entering an extended period of unpredictable unpredictability (Petrie et al. 2017; Petrie 2017).

That the processes of transformation were profound is indicated by the abandonment of major structures at Mohenjo-Daro and other sites by *c.* 1900 BC, as well as ultimate abandonment of all of the cities, bar Harappa. We also see the loss of technical virtuosity, and have evidence for violence, infection and disease at Harappa. In addition to these acute changes, we also see large-scale displacement of settlement concentrations towards the areas of the east that today receive more abundant monsoon rainfall. Significantly, the evidence from Cholistan indicates that mobility and relocation had potentially been common even in the urban period, but the level of settlement displacement between the urban and post-urban periods appears to have been more substantial, and there is similar displacement seen in other regions (Petrie & Lynam in prep). The pattern of the shift is inconsistent, however, and does not just appear to be ‘to the east’, but to particular parts of the eastern regions – possibly to areas that received the most summer rainfall. The degree to which this process was precipitated by the weakening of the Indian Summer Monsoon remains unclear, though we now know that the climate in the Indus region underwent change significant enough to have plausibly had an impact on human populations.

It is important to consider the limits of adaptability in such a context. What happened to the ostensibly robust Indus cities in the face of these changes? Did the climate become too dry? What if choices made by farmers were too diverse? Did urban fragility in the Indus context result from the climate changing beyond the ability of populations to adapt? Such questions encourage consideration of the degree to which Indus populations were fragile and/or resilient in the face of crisis.

Discussions of resilience in the Indus context have been relatively limited. Zerboni et al. (2016, 61) have suggested that centrally controlled Indus socio-economical structures combined with hydroclimatic stress decreased the resilience of Indus populations. In contrast, Petrie et al. (2017; Petrie 2017) have suggested that while: ‘Large cities and high local population densities may have become unsustainable, but sustainability,

resilience and continuity may have been possible by resorting to embracing rural lifeways that saw the maintenance and dispersal of diverse approaches to substance.’ It is arguable that Indus cities were inherently robust because of the nature of long-term resource and cultural investment, and the supply chains that were needed to provision them. They may also have been resilient in the short term, and capable of serving as centres of refuge in times of stress. However, in the face of major hydroclimatic stress they may well have been neither resilient nor sustainable in the longer-term. Nonetheless, while they could ultimately be seen as fragile, Indus cities do not appear to have been fragile in the acute sense.

What we see in the Indus cities contrasts with the Indus rural populations. Indus populations appear to have been resilient, sustainable and capable of continuity through simplification and embracing rural lifeways, with farmers having a range of crops to choose from to suit their local environment and water supply (Petrie 2017; Petrie et al. 2017).

Given the diversity and complexity of the environment across the Indus Civilization, it is unlikely that the weakening of the ISM will have had the same impact everywhere (Wright 2010; Petrie 2017). Petrie et al. (2017) have suggested that climate change may have introduced a degree of entropy into what had become a very complex and interactive urbanized system. Risks to food security will have had a range of economic impacts, and large cities and high local population densities may have become unsustainable. Indus populations certainly appear to have embraced economic simplification in the Late Harappan period through the reduction in the scale of settlements and their interaction networks. Sustainability, resilience and a degree of cultural continuity thus appear to have been possible as a result of more fully embracing rural life-ways that saw the maintenance and dispersal of diverse approaches to substance, including a balance of summer and winter crops. Smaller populations would have been far better suited to a situation where risk mitigation was essential, and smaller groups were also presumably social environments where choices about crops, farming practices and cultural behaviour could be the most flexible. I have suggested that the Late Harappan phase of the Indus Civilization might be a feasible example of sustainability through systematic simplification, following Tainter’s (1988, 151–2; 2006, 98; 2011, 29–31) hypothesis that the Byzantine Empire was sustainable because it systematically simplified, and thereby reduced its consumption.

In the context of trying to draw some robust conclusions in considering the place of the Indus Civilization in the fragility narrative, I contend that



the absence of unequivocal evidence for 'infrastructural power' makes it challenging to properly discuss the fragility of Indus states or political control. Indus cities appear to have been fundamentally stable as urban entities, and the fact that the production and redistribution economy appears to have been extensive, and Indus urban populations engaged in emulation, suggests that there were layers of socio-economic integration across the Indus Civilization. However, this 'veneer' of socio-economic and cultural uniformity and integration overlay considerable variability and diversity of cultural practices (Petrie et al. 2018). It may have been this veneer that was vulnerable to 'shocks' to parts of the overarching system. Weakened winter and summer monsoons from c. 4.3–4.2 ka BP may have had acute and more long-term effects, including ground water depletion, deforestation, and water stress on plants, animals and people. Each of these factors will have invoked responses from Indus populations, and population displacement may have been imperative. We inevitably come back around to debating the nature of 'collapse' and the ways in which it occurs, and it is interesting that Yoffee (2015, 556) has speculated about Indus 'collapse as emigration'. There is some likelihood that Indus populations were always engaging in regular displacement, so we need to refine our understanding of the scale and locus of this process, and the degree to which it entailed changes in social and economic behaviour. Although Indus cities were stable for a protracted period, they appear to have had the potential to be fragile. This fragility is unlikely to have been acute, however, and urban decline appears to have been protracted. It is arguable that the relative robustness of the Indus cities derives from the fact that they were 'built' upon a rural socio-economic underpinning that was inherently resilient and sustainable, which derives from the need to adapt to a variable and diverse environmental context.

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#### Notes

- 1 Trigger (2003, 33–4) left the Indus Civilization out of his *Understanding Early Civilisations* because of its lack of textual evidence, but noted that this 'deprived his sample of significant variations in social organisations and beliefs'.
- 2 Although seeking to focus on other material evidence, Yoffee's (2016, 1056) discussion of Uruk refers to texts that demonstrate the division of labour, highlighting the inescapable attraction of such evidence.