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The Beas River Landscape and Settlement Survey: Preliminary Results from the Site of Vainiwal.

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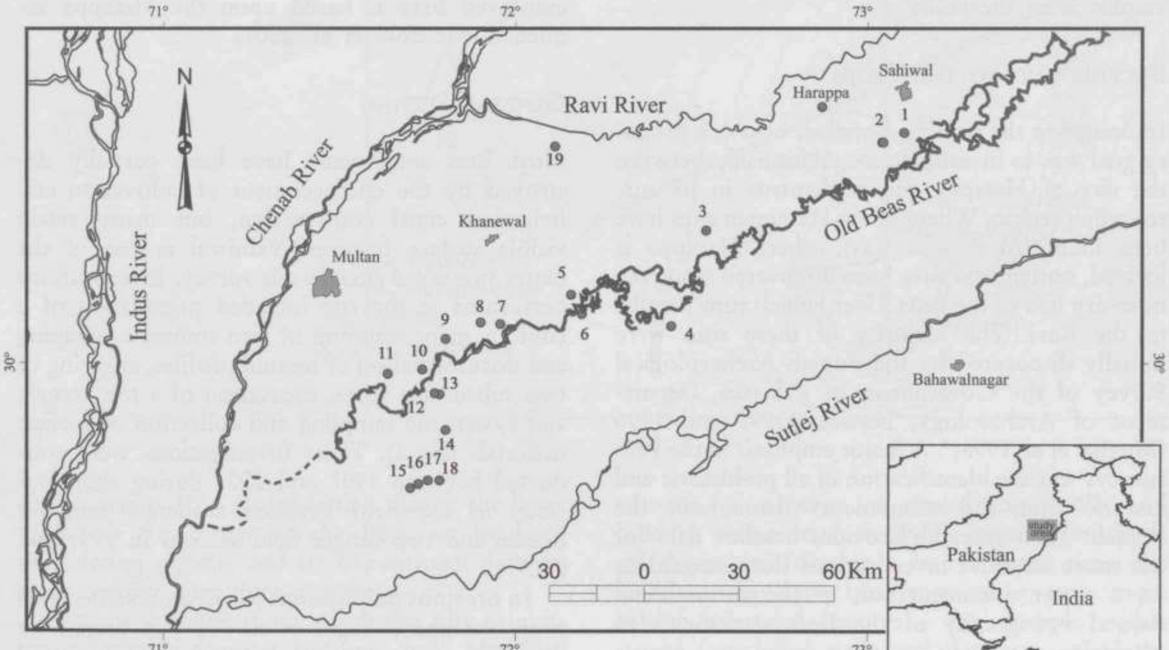
The Beas River Landscape and Settlement Survey: Preliminary Results from the Site of Vainiwal



Key to Archaeological Sites

1. Lahoma Lal Tibba
2. Chak Purbane Syal
3. Chak 90-12L
4. Kusamsar
5. Chak 76-15L
6. Tibba Bagh Thali
7. Vainiwal
8. Chak 104-10R
9. Chak 113-10R
10. Chak 123-10R
11. Chak 133-10R
12. Qutab Pur
13. Chak 160WB
14. Mai Manoori Bhir
15. Bhir Chak 29M
16. Tibba Chak 27M
17. Chak 21M
18. Chak 18-19M
19. Jalil Pur

Fig. 1. Archaeological sites investigated – Beas River Landscape and Settlement Survey.

The study of urbanism is of long-standing interest in the Indus Valley, but few scholars have examined this topic from a regional perspective. Instead, they have focused on a city-centred approach based upon excavations at the civilization's major centres. This emphasis on centres is remarkable, given that a fundamental advantage of urbanism is that the exchange of local goods and services among urban and rural settlements is an effective means of pooling resources and risk[1]. As Robert Adams has shown for Mesopotamia (1981), the emergence of urbanism in antiquity was based upon a mutual dependency between cities and their outlying satellite communities.

Our principal goal in studying the rural settlements discussed in this paper is to better integrate small site analysis into urban studies by reconstructing the infrastructure of the towns and villages that were central to the urban process. Although we assume that where large centres were present an hierarchical arrangement of communities may have existed, and that these arrangements may have represented an organizational form based upon decision-making hierarchies (Wright/John-

[1] For a background to discussions of urbanism in the ancient world see Wright 2002.

son 1975), small sites analysed in urban studies should not be confined to their designation as nodal points in a higher order system. Our attempts in this paper are to provide a more nuanced analysis in which site layout and function may be reliably defined based upon survey data.

Following from these goals, our emphasis has been to fully document key sites through the development of intensive sampling and recording methodologies. In addition to providing data with which to assess site function, this strategy took into account the limitations of our survey permits and the extensive landscape modifications the Punjab has undergone as a result of cultivation and irrigation programs. Below we provide a background to the project and the methodologies employed in the study.

Background to the Project

In designing the project described below, a primary goal was to investigate the relationship between the city of Harappa and settlements in its surrounding region. Whereas few Harappan sites have been identified on the Ravi, where Harappa is located, settlements have been discovered along the now-dry bed of the Beas River, which runs parallel to the Ravi. The majority of these sites were initially discovered by the Punjab Archaeological Survey of the Government of Pakistan, Department of Archaeology, between 1992 and 1996 (Mughal et al. 1996)[2]. A major emphasis in the PAS surveys was the identification of all prehistoric and historic sites and monuments throughout the Punjab. Their research provides baseline data for our more intensive investigations that concentrate on a closer documentation of the cultural and natural stratigraphy of the Beas settlements in particular.

In distinction to previous projects, the Beas River Landscape and Settlement Survey includes an intensive mapping and sampling program and a geoarchaeological component. These data are the basis on which we reconstruct environmental conditions during and after settlement, assess the degree of integration between the Beas settlements and Harappa, and model the onset and abandonment of sites. Our focus in this paper, on the site of Vainiwal, is part of a larger project reported in South Asian Archaeology 2001 (Wright et al., in press). The site is approximately 100 km from Harappa and is one of the larger settlements investigated in the Beas survey. It is one of 19 settlements documented thus far (fig. 1).

The project complements the ongoing excavations at Harappa. Since 1986, the Harappa Archaeological Research Project (HARP) has concentrated its efforts at several locations in the city. Discoveries there have been numerous, especially with respect to chronology, site layout, craft production, and recovery of thousands of objects, many of which are new to Indus assemblages (for examples, see Kenoyer 1998; Meadow et al. 1999; Meadow et al. 2001). Among the many aspects of Harappa that make it important is evidence for a continuous occupation beginning in the Ravi (aspect of the Hakra) Phase and continuing through the Harappa and Late Harappa Phases. Artefactual data from the HARP have enabled us to reconstruct a chronological sequence for survey sites, facilitating a comparison between ceramic and small finds from surface collections with identical objects found in stratified contexts at Harappa. Correlations with the Harappa stratigraphy make it possible to establish a more precise chronological sequence than would have been feasible without benefit of such data. Accordingly, the terminology employed here is based upon the Harappa sequence (Meadow et al. 2001).

General Setting

Most Beas settlements have been partially destroyed by the encroachment of cultivation and irrigation canal construction, but many retain visible surface features. Vainiwal is one of the better preserved sites in our survey. Investigations performed at the site included preparation of a contour map, mapping of two transects, scraping and documentation of mound profiles, augering of two subsurface cores, excavation of a test trench, and systematic sampling and collection of surface materials (fig. 2). These investigations were conducted between 1997 and 2001 during short periods in the field between academic semester breaks and two longer field seasons in 1999 and 2001.

In previous publications focused on settlements near Harappa (Wright et al. 2001, in press), we discussed drainage patterns and environmental conditions based upon subsurface coring. In the Upper Beas the ancient bed is associated with either the Bari Doab – the local designation for the flanking Upper Pleistocene bar landform – or gentle scarps that grade to the lower alluvial surfaces of the Holocene floodplain (Schuldenrein et al. 2004). In distinction, investigations of the Lower Beas suggest its channel was flanked by dunes when the earliest occupants of Vainiwal reached the site. The most prominent features of the landscape are a series of lozenge shaped linear dunes oriented south to southeast that flank the distal margins of the ancient stream channel. The dunes themselves rise 1.5–4 m above the surrounding plains and are built up of well sorted medium to fine-medium sands. Field studies suggest the dunes are still being reconfigured and that defla-

[2] Vainiwal, the site featured in this paper, was identified by M. Sharif prior to the Punjab Archaeological Survey (1989).

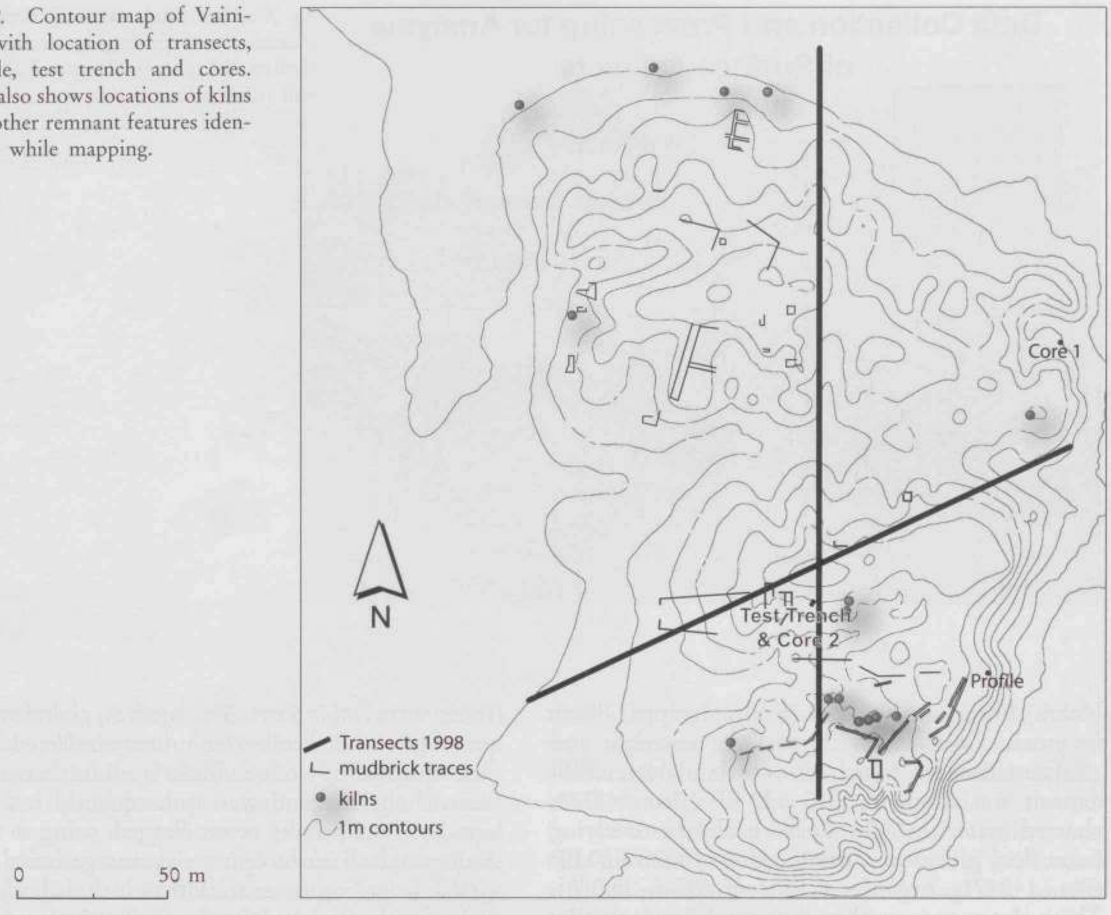


Fig. 2. Contour map of Vainival with location of transects, profile, test trench and cores. Plan also shows locations of kilns and other remnant features identified while mapping.

tion is active. It is probable that during the latter Holocene the course of the Beas, its localized meandering regime, and its depositional patterns were modified by dune activity.

Extensive distributions of olivine silts exhibiting prominent laminar bedding were identified along the southern and eastern margins of the Vainiwal mound. These bedded silts are clearly the product of standing water, but it is unclear if the sediments are recent or are of an earlier age. Calcareous nodules and crusts offer some indications of former spring flow, but thus far no unequivocal datable sediments (i. e. tufas) have been recovered to test for potential chronometric equivalence between local springs and the Harappan occupation.

The Vainiwal site landform is currently a north-south trending lobate, consisting of three mounds, measuring nearly 4 hectares (fig. 2); artefacts continue into surrounding fields suggesting it may have extended over 7 hectares. The site rises 7–12 m above the dune fields and broader Beas plain. A narrow saddle connects the broader oval-shaped northern mound to the central and south mounds, which are oblong to circular in shape. Surface topographies across each of the three mound segments have been modified by sustained head-cutting and by colluviation. The surface terrain consists of a series of undulating knolls and hillocks with a network of rills incising across the midslopes and footslopes. In Harappan times the landform may have been continuous, since more robust structural features – for example visible streets, foundation walls, and platforms – mark the edges of mound segments; these clay and mud reinforced structures have proved resistant to sustained long-term erosion. The fanning out of the current mounds from their midslopes to the outer margins indicates the presence of ancient structures and associated activity areas.

Development of site chronology is partially based upon a 3 m deep test trench on the interior portion of the central mound (fig. 2), where discrete cultural strata were isolated. These strata were diverse and their sedimentary matrices ranged from reworked cultural fills (colluvial sets and slopewash fines containing mobilized pottery and manufacturing debris) to features (hearths; firing sites; burnt floors); remnant deposits of standing water (oxidized and reduced silty sands and laminar olivine silts); and structural components (mud brick courses; Harappa Phase walls). Although the lowermost occupation horizon within the profile produced a radiocarbon age of 4190 ± 40 BP (Beta-142272; organic sediment; $^{13}C = -21.3\%$) on feature charcoal and falls within the Ravi (aspect of the

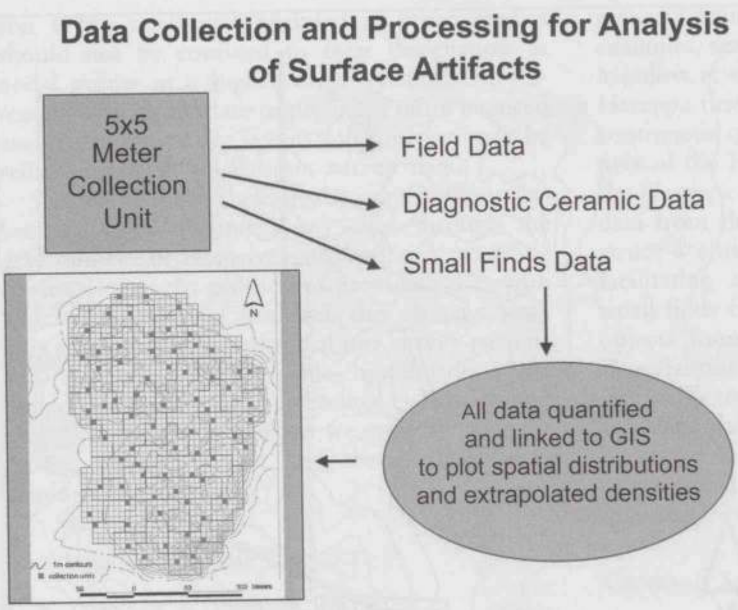


Fig. 3. Flow chart showing sampling, collection and processing strategy including site plan with quandrant and unit distribution.

Hakra) Phase, the Kot Diji (Early Harappa) Phase is more consistent with surface materials and artefacts from the trench. Two metres above, a fill deposit was dated to 3910 ± 40 BP (Beta-142273; charred material; $^{13}C = -26.6\%$), and an overlying burnt floor provided a determination of 3820 ± 60 BP (Beta-142271; organic sediment; $^{13}C = -25.0\%$). These dates suggest that the transition from the Kot Diji (Early Harappa) Phase to Harappa Phase is registered within the central sedimentary sequence at the site. The restricted size of the trench precluded access to a basal sedimentary strata; therefore, no occupation levels predating the Kot Diji (Early Harappa) Phase were observed.

Sampling and Collection Strategy

A systematic mapping and collection strategy was employed at all sites documented in our survey (fig. 3). The methodology included mapping contours and visible surface features and creating a surface grid for each site. This 5 × 5 m grid was the basis for designing a modified random sample that provided maximum coverage. At Vainiwal, the gridded surface was divided into equal quadrats (there were 1460 5 m × 5 m squares, therefore 73 quadrats) and one collection unit was selected from each quadrat. Two quadrats lay in inaccessible areas of the site and were subsequently not collected. The 71 units were flagged using a total station and all surface material was gathered and sorted according to criteria that included separation of industrial and structural materials as well as collection of diagnostic artefacts. Our sampling of surface remains showed that the entire site of Vainiwal is covered with dense concentrations of ceramic and other cultural debris.

Field recording was limited to counts and weights of non-diagnostic ceramic sherds and other materials, left in place at the individual units. Figure 4 presents total amounts of field recorded artefacts for Vainiwal comprising ceramic sherds, fired clay nodules and terracotta cakes, and small bits of undifferentiated fired clay debris (e. g. tiny sherds, small bits of nodules, cakes and brick). The examples presented include high and low unit counts and weights for these categories from each mound; one unit (457) with the highest total count contained 15,583 objects weighing 136.4 kilos. The unit with the lowest recovery, 412, consisted of 498 objects weighing 3 kg.

Location within the site	Unit #	Total Sherd Count	Sherd Weight	Fired Nodules /Cakes	Nodule /Cake Weight	Undif-ferentiated Debris	Debris Weight	Total Artifact Count	Total Artifact Weight
Totals for all units collected		158.268	1.432,1	140.673	1.204,9	135.689	454,5	434.630	3.091,5
South Mound	412	194	1,5	106	1,1	198	0,4	498	3,0
	415	3.754	33,9	7.702	49,2	0	0,0	11.456	83,1
Central Mound	431	377	8,1	38	1,1	1.990	8,1	2.405	17,3
	437	2.611	33,4	3.984	81,2	23	2,6	6.618	117,2
North Mound	452	303	5,0	891	4,3	1.043	5,3	2.237	14,6
	457	2.093	39,0	11.240	86,8	2.250	10,6	15.583	136,4

Fig. 4. Total amounts of field recorded artefacts for Vainiwal.

Fig. 5. View of South Mound at Vainwal showing large eroded mudbrick structure. Inset at lower left is a closeup of an in situ kiln obscured by brush in larger photograph.

Recording of diagnostic artefacts included 12,451 ceramic sherds and 3,506 small finds and was conducted at the HARP facility using protocols that had been developed for recording materials from ongoing excavations at Harappa. Three separate databases were created to facilitate analysis of collection units. An Access relational database (MS Access 2002) was developed for incorporation and analysis of field recorded data, and diagnostic ceramics. Subsequently, small finds data were also quantified within the newly established database to facilitate an analysis using distribution maps generated by Geographic Information System (GIS) software (ArcView 3.2a).

This methodology was designed to establish correlations between documented surface features and specific artefact categories. We considered fixed installations, such as streets, walls, and kilns to represent Boundary Markers for initial identification of activities, whereas surface finds, primarily pottery, are Contact Zones to test and refine our identifications of activity areas.

As discussed above, Vainiwal consists of three mounds, a north, central and south mound, and a number of features remain visible on its surface (fig. 2). Remnants of a mudbrick wall were discovered between the central and south mounds, oriented to the boundary of the south mound, and visible streets appear to follow a network pattern. There are traces of small-scale buildings present on the north and central mounds.

Figure 5 shows two additional features of significance. The photo shows an extraordinarily well preserved large-scale mudbrick construction encompassing the south mound. We were able to examine the southern edge of the south mound, since it is heavily eroded by a gully. Mudbrick was visible in the gully profile, suggesting the brick may represent a platform structure. Remnants of additional slumped brick were identified at the southern edge of the central mound. A second feature shown as an inset on figure 5 reveals traces of a kiln and a concentration of baked brick and vitrified sherds and nodules eroding out of the south mound. Its structure is consistent with kilns in Period 3 at Harappa. Other ceramic kilns are visible at the interface of the southern side of the central mound and northern side of the south mound aligned on either side of a broad street, while three others lie at the periphery of the north mound (fig. 2).

Interpretation of Spatial Distributions

To refine our understanding of the spatial distribution of remnant features outlined above, we plotted densities of selected surface finds and in the following we discuss two aspects of our results, firstly the chronology and secondly activity areas[3]. Ceramic finds correlate with the radiocarbon ages secured in the test trench discussed previously. They include typical Kot Diji (Early Harappa) Phase types found in Period 2 at Harappa and others that, although found in smaller quantities, are types associated with settlements in Baluchistan, such as Faiz Mohammad and Quetta Wet Ware. The bulk of the ceramics contemporary with

[3] At Harappa, Heather Miller (personal communication, 2004) identified discrete spatial locations in the city where evidence for manufacturing of a variety of materials existed. The relationship of these patterns to site layout have been addressed elsewhere (Wright/Malin-Boyce 2004).

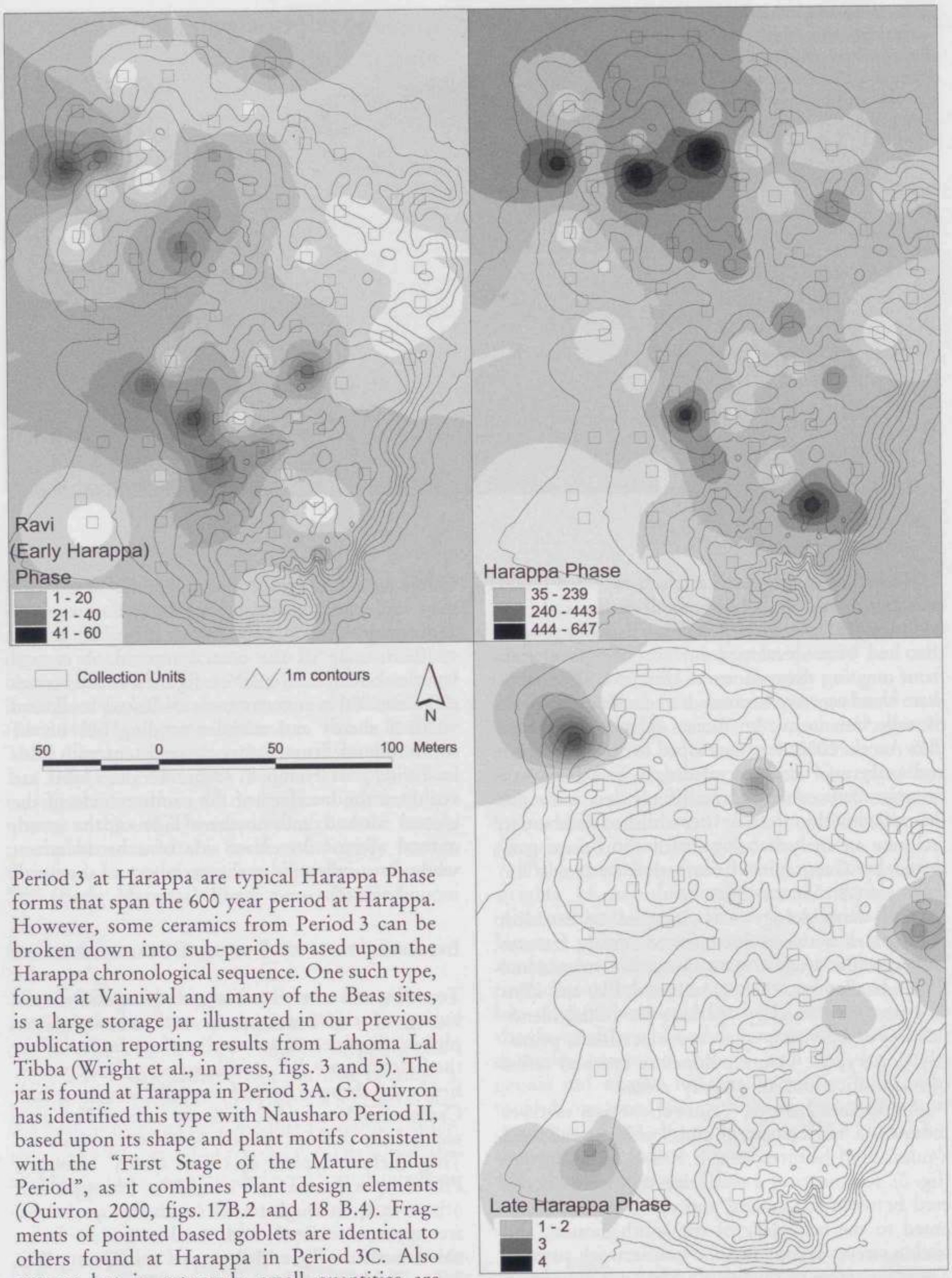


Fig. 6. Extrapolated densities of chronologically indicative sherds recorded at Vainwal, Pakistan. Quantities of diagnostic sherds identified with each occupation phase are provided.

Period 3 at Harappa are typical Harappa Phase forms that span the 600 year period at Harappa. However, some ceramics from Period 3 can be broken down into sub-periods based upon the Harappa chronological sequence. One such type, found at Vainiwal and many of the Beas sites, is a large storage jar illustrated in our previous publication reporting results from Lahoma Lal Tibba (Wright et al., in press, figs. 3 and 5). The jar is found at Harappa in Period 3A. G. Quivron has identified this type with Nausharo Period II, based upon its shape and plant motifs consistent with the "First Stage of the Mature Indus Period", as it combines plant design elements (Quivron 2000, figs. 17B.2 and 18 B.4). Fragments of pointed based goblets are identical to others found at Harappa in Period 3C. Also present but in extremely small quantities are ceramics from the Late Harappa Phase.

In addition to ceramic vessels, we have discovered small finds representative of both the Kot Diji (Early Harappa) Phase and Harappa Phase. They include animal figurines; carts and wheels, suggesting that animals at Vainiwal were used for traction; terracotta and shell bangles;

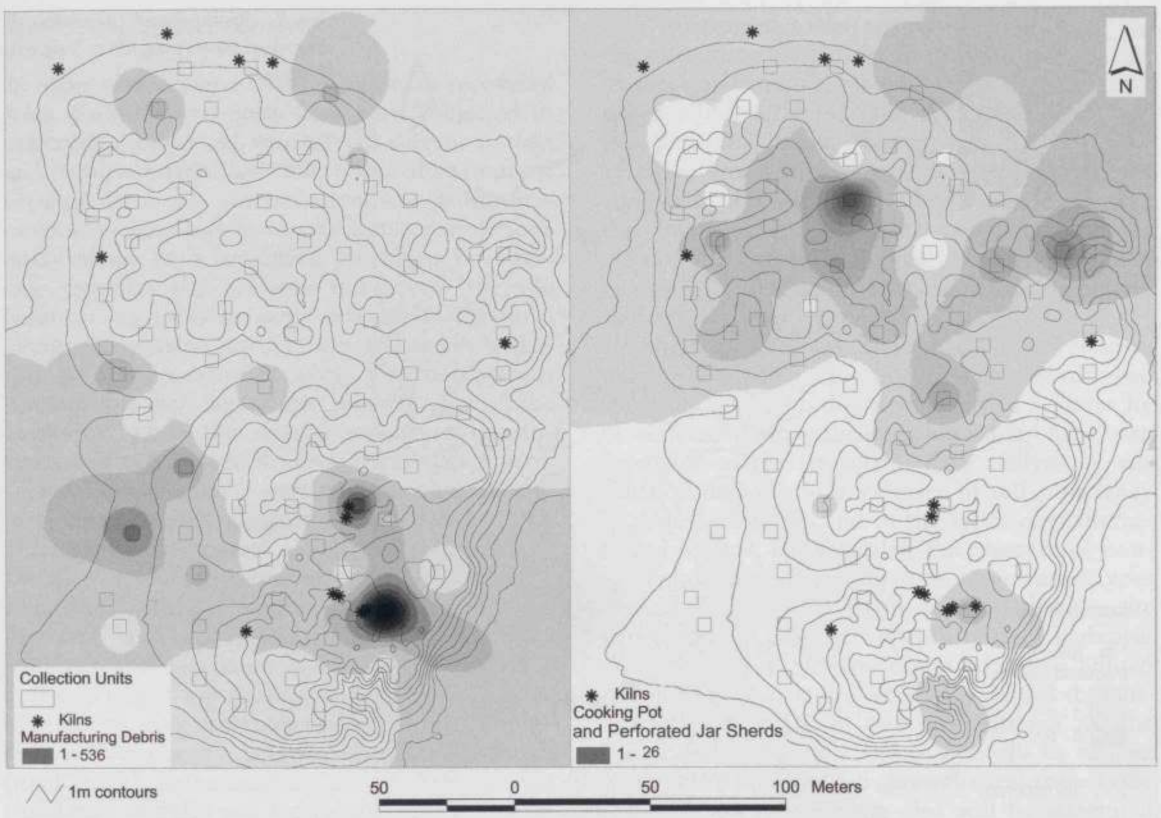


Fig. 7. Comparison of extrapolated densities of manufacturing debris (left) and two types of household pottery (right) at Vainwal, Pakistan.

chert (including blades and cores); beads (faience, steatite and terracotta); grinding stone and pestle fragments; copper and unworked stone, including lapis lazuli. There are quantities of baked brick, fired clay nodules and terracotta cakes near kilns. The fired clay nodules are also associated with traces of residential structures.

Ceramic Distributions and Chronology

The three maps shown in figure 6 are based upon quantification of collected data, where the spatial patterns provided a record of relative densities of chronologically sensitive materials. Distributions for 54 of the 71 units are shown.

Kot Diji (Early Harappa) Phase sherd densities are plotted on the map at the upper left. Spatial distributions indicate that all mounds contain Kot Diji (Early Harappa) Phase ceramics. Processes of erosion that may play a role in preservation and distribution of these ceramics will be discussed below.

The Harappa Phase sherd densities plotted on the map at the upper right show intensive occupation of all the mounds during this period with the highest sherd densities in the central areas of the north mound. As discussed above, our diagnostic data are sufficiently refined that, in the future, we hope to subdivide the Harappa Phase chronology for this dominant period of occupation. The overall number of Harappa Phase sherds is greater than for the Kot Diji (Early Harappa) Phase and undoubtedly Kot Diji (Early Harappa) Phase levels are obscured by the overall intensity of the Harappa Phase materials.

The distributions, densities and total number of Late Harappa Phase sherds, on the map at the lower right, were significantly different from the Kot Diji (Early Harappa) Phase and Harappa Phase plots. Although present on all mounds, their numbers are small.

These differences in densities of sherds and their locations are suggestive of the development of Vainiwal. Though preservation may have influenced our impression, our data indicate that occupation was concentrated on the north and central mounds during the Kot Diji (Early Harappa) and Harappa Phases. The vast quantities of Harappa Phase materials representative of all of the sub-phases of occupation at Harappa suggest that Vainiwal sustained itself throughout the Harappa Phase and likely grew in population, expanding to the north and south mounds during the same period in which Harappa itself grew in size. Finally, there is a marked drop off in densities in the Late Harappa Phase that is consistent with diminished occupation at Harappa during this period.

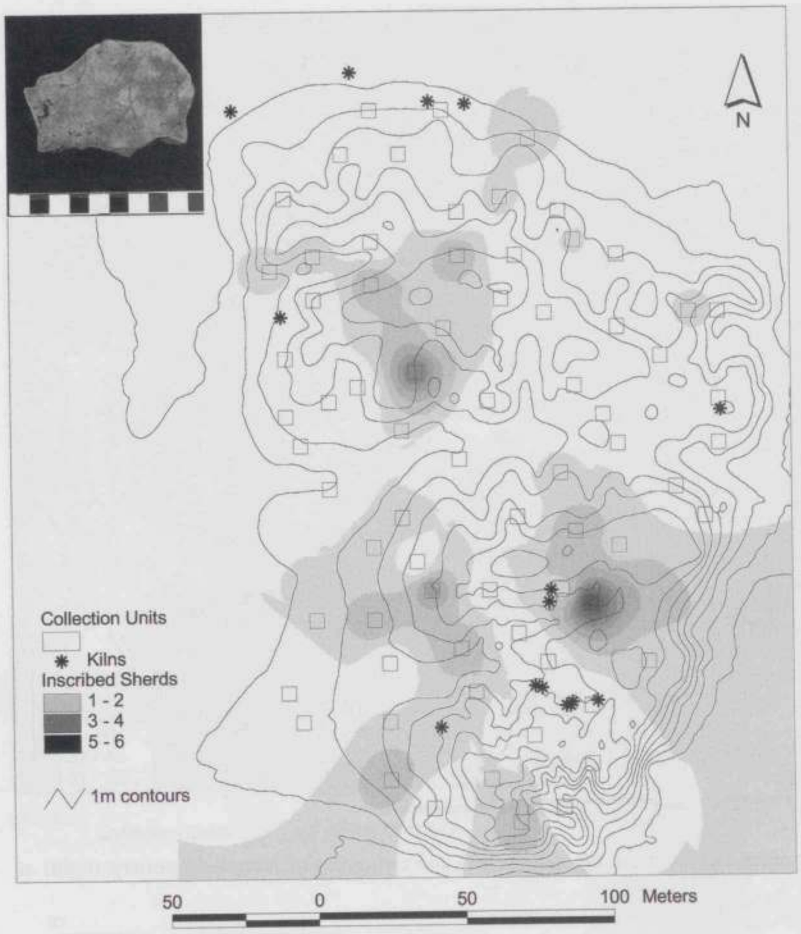


Fig. 8. Extrapolated densities of inscribed pottery sherds at Vainwal, Pakistan.

Ceramics and Activity Areas

Figure 7, showing the location of kilns, displays densities of selected ceramics and other debris and correlates spatial distributions of site features with function through an identification of activity areas. The figure contains two plots reflecting spatial distributions of materials we considered non-industrial and associated with residential or household areas plotted against industrial debris.

With respect to industrial activities, we first examined the distribution of kilns, represented by the stars, since these installations were *in situ* and not mobilized by erosion. With one exception the kilns are located on the periphery of mounds. On the map at left, densities of materials associated with ceramic production were mapped, including kiln debris and overfired ceramics sherds. The close association of the industrial debris with the ceramic kilns confirmed that while there has been some movement of surface materials, the mobilization of artefacts has not obscured the observable relationship between activity areas and the objects utilized and produced by those activities.

Densities of materials associated with households (at right), which we defined as cooking pots and perforated jars, were concentrated primarily on the north mound, throughout the area with traces of small-scale mud-brick architecture (see fig. 2).

The comparison shows that ceramic production took place along the margins of mounds and in discrete areas, whereas residential structures are distributed within the interior of the site and largely separated from pyrotechnical activities. The latter generally are clustered together and correlate with the highest densities of related debris. The presence of production debris in locations where kilns are not visible in a few cases may be due to erosion processes or alternatively to places where kiln traces have been obscured or are below the surface.

Although we have not found seals or sealings in our surface collections, we have recovered 34 sherds diagnostic of the Kot Diji (Early Harappa) and Harappa Phases on which signs are inscribed (see inset on fig. 8). Some have only one sign, while others include several. The highest densities of inscribed materials are along the southern edge of the central mound where manufacturing activities are concentrated, but they are present throughout the site.

Site Formation Processes

In order to determine whether materials recovered from our sampling units have been subjected to patterned erosion and whether the current artefact and feature distribution reflects site abandonment configurations or post-abandonment sedimentation and erosion trends, we conducted a small-scale study of the site's formation processes. Two surface transects (fig. 2) were run across the site landform to measure slope and surface textures along approximate north-south and north-northeast to south-southwest axes. The north-south transect was run across the primary axis of the landform, while the north-northeast to south-southwest axis crossed the central mound segment.

Field measurements were made using an Abney level clinometer to measure slope. Distances and bearings were measured using compass and tape. Detailed visual descriptions were recorded to characterize surface texture – or the composition, densities, and configuration of larger surface materials and vegetation blanketing the terrain – between major topographic breaks (gullies, rills, or rivulets). Key materials observed include artefacts such as pottery, compact structural materials (mud brick), manufacturing and building debris (fired clay nodules and fragments of ceramic kiln linings). Our recorded observations are consistent with the surface analyses discussed above. In general, the study of patterned erosion using the surface texture assessment verified that most erosion across the site served to mobilize artefacts locally. Headcutting may have moved assemblages from their original post-abandonment loci, but not significantly. General activity areas are recognizable, even if ancient surfaces were removed. In some cases, large numbers of artefacts were moved over short distances, collapsing near the place of surface attrition during gullying. This interpretation of site formation processes substantiates patterns observed in our collection units and shown in figure 2.

Conclusion

By combining surface collections and GIS, we were able to spatially plot quantified distributions of materials and features, facilitating a visual pattern analysis that would not have been possible in any other way given the masses of materials visible on the site surface. Our analyses show a long history at Vainiwal with its origins at least by the Kot Diji (Early Harappa) Phase, an expansion of occupation in the Harappa Phase, and decline in the Late Harappa Phase. The settlement at Vainiwal appears as a predominantly residential town that was also engaged in specialized manufacturing. The evidence for a large platform on the south mound leaves open the possibility that larger non-residential structures may also have been present.

With respect to its association with Harappa, there are many similarities in materials at Vainiwal to those at Harappa, including diagnostic ceramic types and small finds. The presence of script in the Kot Diji (Early Harappa) Phase and the Harappa Phase similarly indicates that at least some individuals at Vainiwal were conversant with the Indus script. It further suggests that the development of written communication may have co-occurred at rural settlements and major centres such as Harappa.

Although Vainiwal clearly had ties to Harappa, judging by the overall similarity of ceramics and small finds, and no doubt was part of a hierarchy of settlements along the Beas, it need not have been a satellite to the larger site. Our analysis of site function demonstrates a degree of self-sufficiency in craft production and in the types of manufacturing present. In particular, the presence of non-local chert, semi-precious stone and ceramic types associated with Baluchistan, suggests that the site participated in a wider network beyond Harappa.

In this paper, we have discussed only a limited portion of the data collected at Vainiwal to demonstrate the utility of our methodology. In the future, these materials and others will be refined to include a finer grained chronological analysis for the Harappa Phase. They also will be integrated with environmental data collected throughout all segments of the Beas bed in the context of a larger regional perspective that includes other settlements within the drainage network.

Like other sites we have investigated in the survey, Vainiwal is constantly subjected to encroachment by cultivators. Thus far its height and undulating surface features have slowed its destruction, but we have seen the gradual modification of high mounds elsewhere effected by the continued chipping away at their margins, as already has begun at Vainiwal. The site is of enormous importance to understanding rural/urban interaction. Unlike many Harappa Phase sites Vainiwal has a well-preserved stratigraphic profile from the Kot Diji (Early Harappa) Phase to the Late Harappa Phase. We hope in the future to be able to excavate at Vainiwal. In this event, our GIS mapping program will provide us with a baseline for selecting excavation areas.

Acknowledgements

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