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Settlement Pattern and Resource Adaptation of Hakra Communities in Haryana

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Abstract: *The Hakra cultural horizon represents one of the earliest phases of protohistoric development in the north-western Indian subcontinent and constitutes the formative stage preceding the emergence of the Harappan Civilization. Initially identified through extensive surveys along the dry course of the Hakra River in the Cholistan Desert, this cultural tradition is characterized by distinctive ceramic assemblages and dispersed settlements closely associated with palaeochannel systems (Mughal, 1990). Subsequent archaeological investigations have revealed an eastern extension of this tradition into the Upper Sarasvati–Drishadvati basin of present-day Haryana, where excavations at sites such as Kunal, Bhirrana, Farmana, and Girawad indicate the presence of early agro-pastoral communities adapting to a fertile alluvial environment (Parmar & Shinde, 2011).*

Comparative analysis suggests that while Cholistan Hakra settlements exhibit a higher proportion of temporary or semi-mobile camps adapted to semi-arid conditions, the Haryana sites demonstrate increasing sedentism supported by stable water sources, cultivable soils, and access to raw materials from the Aravalli hinterland (Garge, 2014). Archaeobotanical evidence further points to diversified subsistence strategies, including the cultivation of drought-resistant millets alongside other crops, reflecting flexible agricultural adaptation to regional ecological settings (Pokharia et al., 2014).

This study examines the settlement distribution and resource-use strategies of Hakra communities in Haryana in comparison with the Cholistan type-region, highlighting how environmental variability shaped early cultural trajectories and contributed to the transition toward more organized Early Harappan socio-economic systems.

Keywords: *Hakra Culture, Eastern Hakra Phase, Protohistory of Haryana, Settlement Pattern; Ghaggar–Sarasvati Basin, Saraswati–Drishadvati System, Resource Adaptation, Agro-pastoral Economy; Palaeochannel Settlement, Early Agricultural Communities, Upper Sarasvati Basin; Cholistan Desert, Environmental Archaeology, Indus Pre-Urban Phase, Early Harappan Transition*

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1. INTRODUCTION

The Hakra cultural horizon constitutes one of the earliest organized cultural expressions within the protohistoric sequence of the north-western Indian subcontinent and represents a formative stage preceding the emergence of the Early Harappan tradition. First systematically identified through regional surveys along the now-dry Hakra River in the Cholistan Desert of Pakistan, this cultural complex is defined primarily by a distinctive ceramic assemblage and a dispersed settlement pattern aligned with palaeochannel systems (Mughal 1990). Radiometric assessments and stratigraphic correlations broadly situate the Hakra phase within the fourth millennium BCE, positioning it within the Regionalization Era that laid the foundations for later Harappan socio-economic developments.

Archaeological investigations over the past several decades have demonstrated that the distribution of Hakra cultural material extends significantly beyond its Cholistan type-region. Excavations in the Upper Sarasvati–Drishadvati basin of present-day Haryana have revealed early occupation levels at sites such as Kunal, Bhirrana, Farmana, and Girawad, where Hakra Ware ceramics occur in association with pit-dwellings, hearths, storage facilities, and evidence of agro-pastoral subsistence (Parmar & Shinde 2011). These findings establish the eastern sector as an integral component of the broader Hakra interaction sphere rather than a peripheral extension. The term "Eastern Hakra Phase" has therefore been employed to denote this regional manifestation, characterized by adaptation to the fertile alluvial plains of the Ghaggar–Chautang interfluve.

Environmental context appears to have played a decisive role in shaping regional expressions of Hakra settlement. In Cholistan, nearly ninety-nine documented Hakra Ware sites are distributed along the abandoned course of the Hakra River, many of which consist of small artefact scatters with minimal architectural investment, suggesting temporary or seasonally shifting occupations adapted to a semi-arid desert-river interface (Mughal 1990; Dogar & Sadique 2022). By contrast, the Upper Sarasvati basin provided comparatively stable alluvial soils, accessible water sources, and proximity to upland raw-material zones of the Aravalli and Siwalik systems. Geoarchaeological and settlement studies indicate that this environmental matrix supported repeated occupation and greater investment in habitation features (Garge 2014; Singh et al. 2011).

Subsistence evidence further highlights the adaptive variability of Hakra communities. Archaeobotanical research across the north-western subcontinent demonstrates diversified crop regimes including wheat, barley, pulses, and drought-resistant millets, indicating flexible agricultural strategies designed to buffer climatic uncertainty (Pokharia et al. 2014). Complementary zooarchaeological datasets from early levels at Haryana sites show the predominance of domesticated cattle, sheep, and goats, supplemented by limited hunting and aquatic exploitation, confirming the integration of cultivation with pastoral lifeways during the Hakra phase (Ritu & Rajpal 2025). These datasets collectively indicate that the Hakra horizon was not a homogeneous pre-urban stage but a mosaic of regionally conditioned agro-pastoral adaptations.

The present study re-examines the settlement distribution, structural evidence, and resource-use strategies of Hakra communities in Haryana in comparison with the Cholistan type-region. By synthesizing excavation data, regional survey results, archaeobotanical research, and zooarchaeological analysis, this paper evaluates how contrasting ecological settings influenced settlement investment, subsistence organization, and patterns of regional stabilization. In doing so, it situates the Eastern Hakra Phase within the broader developmental trajectory that culminated in the emergence of Early Harappan settlement systems during the third millennium BCE.

2. REGIONAL EXPRESSIONS OF THE HAKRA CULTURAL TRADITION

Archaeological evidence demonstrates that the Hakra cultural horizon was not uniform but manifested in regionally distinct adaptive zones across the greater Ghaggar–Hakra system. These variants reflect differences in geomorphology, river dynamics, resource zones, and settlement organization (Parmar & Shinde, 2011; Mughal, 1990).

2.1. Cholistan Hakra Phase (Southern Hakra – Bahawalpur Region, Pakistan)

The Cholistan Hakra Phase represents the type-area of the culture and is located primarily in the Cholistan Desert of the Bahawalpur Division in Punjab Province, Pakistan. Archaeological surveys conducted by Mughal documented nearly one hundred Hakra Ware sites distributed along the dry course of the Hakra River, forming a dense settlement system aligned with palaeochannel networks (Mughal, 1990). Among the prominent Hakra sites recorded in this region are Jalwali, Derawar Fort area settlements, Marot, Chak 76/DB, and several clusters along the Hakra channel belt, all of which demonstrate early pre-urban occupation associated with riverine landscapes. These sites are generally small and dispersed rather than nucleated centres, suggesting habitation by modest agro-pastoral communities. Structural remains are limited, indicating light architectural investment and, in many cases, temporary or seasonal occupation. Their consistent placement on palaeochannel levees highlights the strategic dependence of these settlements on ancient river courses for water availability, subsistence, and movement across the landscape. This settlement configuration reflects adaptation to a semi-arid desert margin where communities practiced flexible agro-pastoral strategies in response to fluctuating river regimes and environmental instability (Mughal, 1990; Dogar & Sadique, 2022).

2.2. Northern Hakra Phase (Punjab Province, Pakistan)

The Northern Hakra Phase is situated in the northern sectors of the Hakra–Ghaggar system within the Punjab Province of Pakistan, particularly in the region approaching the Ravi–Sutlej interfluve. In contrast to the arid desert environment of Cholistan, this area is characterized by relatively stable alluvial plains and transitional riverine corridors that provided more favorable conditions for sustained settlement. These landscapes formed an important ecological interface linking Hakra communities with regions that later witnessed the development of Ravi-phase and Early Harappan cultural expressions. Archaeological evidence suggests that settlements in this northern zone were somewhat larger and more continuous than those in Cholistan, indicating reduced mobility and a greater reliance on agriculture supported by fertile soils and accessible water resources. The material assemblages and settlement organization point toward increasing interaction with emerging Early Harappan cultural traits, reflecting a gradual shift from highly mobile adaptations toward more settled agro-pastoral lifeways (Parmar & Shinde, 2011).

2.3. Sindhi Hakra Phase (Lower Indus–Sindh Region, Pakistan)

The Sindhi Hakra Phase extends southward into the region of Sindh, where Hakra-related assemblages occur within the lower Indus alluvial system. In contrast to the more dispersed settlements of Cholistan, this region shows increasing settlement nucleation and a clearer tendency toward more stable agricultural lifeways. The well-watered floodplains of the lower Indus provided favourable conditions for cultivation, enabling communities to sustain longer-term occupation and develop more structured settlement organization. Archaeological evidence from this zone also indicates growing cultural interaction with early Indus traditions, suggesting that Hakra communities here were gradually

integrating into the developmental processes that would later characterize the Early Harappan period (Parmar & Shinde, 2011).

2.4. Eastern Hakra Phase (Upper Sarasvati–Drishadvati Basin, Haryana, India)

The Eastern Hakra Phase represents the easternmost regional adaptation of the Hakra cultural tradition and is located in the Upper Sarasvati–Drishadvati basin of present-day Haryana. Settlements belonging to this phase are typically positioned along the palaeochannels of the Ghaggar–Sarasvati

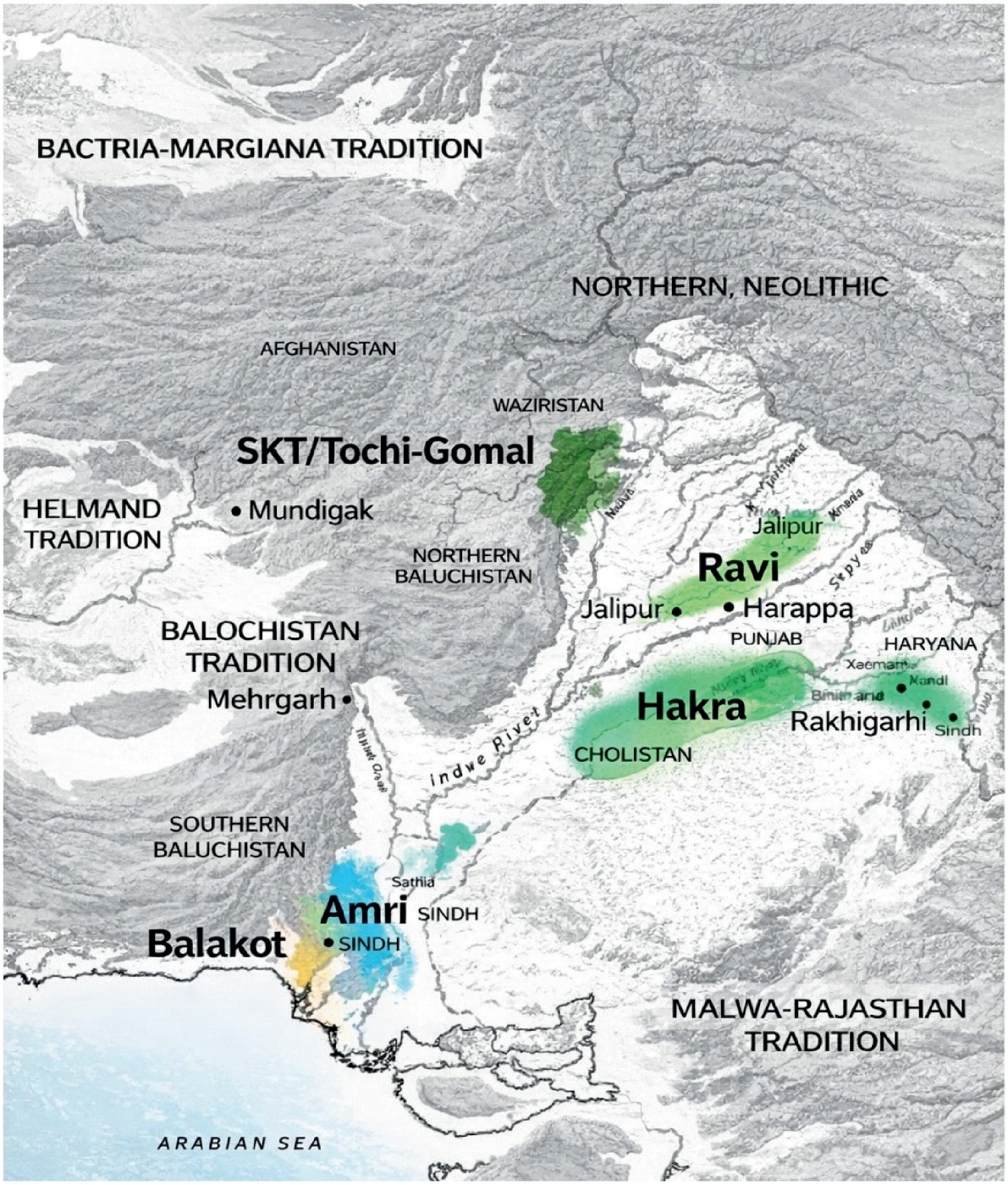

Figure 1: Indus Tradition cultures of the Regionalization, Integration and Localization Eras, Regionalization Era – Ravi Phase (Harappa) (ca. mid 4th to mid 3rd millennium BC), (Coursey: Law 2011)

system, reflecting a deliberate preference for locations that ensured access to water and cultivable land. Excavations at sites such as Kunal, Bhirrana, Farmana, and Girawad have revealed habitation features including pit-dwellings, hearths, and evidence of repeated occupation, indicating a pattern of sustained settlement rather than seasonal encampment. The fertile alluvial soils of this region supported early agricultural practices, while the proximity of the Aravalli hill ranges provided access to lithic and mineral resources necessary for tool production and other subsistence activities. In contrast to the highly mobile, desert-oriented settlements of Cholistan, Eastern Hakra communities display clear signs of increasing sedentism and ecological stabilization, suggesting that this region offered a comparatively favourable environmental niche that encouraged the consolidation of agro-pastoral lifeways and laid an important foundation for the emergence of Early Harappan settlement organization (Parmar & Shinde, 2011).

3. DEFINING CHARACTERISTICS OF HAKRA CULTURE

The cultural identity of the Hakra horizon has been defined primarily through its distinctive ceramic assemblage and associated settlement traits. Early research in Cholistan emphasized that Hakra ceramics form a clearly recognizable technological and stylistic tradition within the pre- Harappan sequence. These wares include both handmade and wheel-made red fabrics treated with a variety of surface techniques, among which mud-appliqué and incised decoration are especially diagnostic (Mughal, 1990). The mud-appliqué technique consists of applying additional clay in bands or patches on vessel exteriors, while the incised variety displays linear or geometric designs engraved either before or after firing. Such treatments produce a visually distinctive assemblage that differentiates Hakra pottery from later Early Harappan ceramic traditions.

Further typological studies have shown that Hakra assemblages also include tan-slipped or chocolate-slipped wares, black-on-red painted pottery, burnished surfaces, and medium-to-thick-bodied storage vessels. These ceramic forms demonstrate both functional diversity and technological competence, indicating an already well-established craft tradition rather than an experimental stage of production. Excavations at sites such as Bhirrana have refined this classification by identifying multiple ceramic categories, including mud-appliqué ware, incised ware, chocolate-slipped ware, black-burnished ware, bichrome pottery, and plain red ware, suggesting regional variation within a shared cultural framework (Rao et al., 2005; Parmar & Shinde, 2011).

The recurrence of these ceramic traditions across Cholistan and the Sarasvati–Drishadvati basin confirms cultural continuity between western and eastern Hakra regions and supports the interpretation that these communities formed part of a broad interaction sphere extending across the Ghaggar–Hakra system (Keserwani & Kumar, 2013

4. REGIONAL SETTING: THE UPPER SARASVATI BASIN

The Hakra settlements of Haryana are situated within the Ghaggar–Chautang interfluve, traditionally identified with the ancient Sarasvati–Drishadvati system. Geo-archaeological and settlement studies indicate that this region once sustained an active fluvial network capable of supporting dense protohistoric occupation (Garge, 2014). The distribution of sites shows a marked tendency to cluster along relict channels and fertile alluvial tracts, demonstrating a close relationship between settlement location and the availability of hydrological resources. Systematic surveys of the Ghaggar basin have highlighted the importance of landscape context in understanding protohistoric settlement systems. Field investigations across large parts of Haryana documented numerous sites positioned in relation to river courses, soil types, and ecological niches, emphasizing the decisive role of environmental

conditions in shaping habitation patterns (Singh et al., 2011). Unlike the arid desert margins of Cholistan, the Haryana region offered comparatively stable ecological settings, including arable soils suitable for cultivation, grazing grounds for pastoral activity, and access to lithic and mineral resources from nearby upland zones. This combination fostered a mixed agro-pastoral economy and encouraged longer-term settlement stability.

5. DISTRIBUTION OF HAKRA SITES IN HARYANA

The eastern spread of the Hakra cultural tradition into Haryana is now well attested through archaeological explorations conducted along the palaeochannels of the Saraswati–Drishadvati system. Rather than representing isolated occurrences, the Hakra presence in this region forms a coherent settlement network aligned with ancient river courses, indicating that hydrological and ecological factors played a decisive role in determining habitation zones (Keserwani & Kumar, 2013). These investigations identified **sixteen Hakra-related sites in Haryana**, demonstrating that the culture extended far beyond its core distribution in Cholistan and occupied the fertile plains of the Upper Sarasvati basin (Keserwani & Kumar, 2013).

5.1. Spatial Context: The Saraswati–Drishadvati Corridor

The Hakra sites in Haryana are primarily distributed along relict channels of the Ghaggar (ancient Sarasvati) and its tributary systems, where periodic flooding would have replenished soils and created favourable conditions for early cultivation. Settlement clustering along these palaeochannels reflects deliberate ecological selection rather than random dispersal (Garge, 2014). Similar river-oriented distribution patterns have also been observed in regional surveys of the Ghaggar basin, reinforcing the importance of landscape and water availability in shaping protohistoric habitation (Singh et al., 2011).

This pattern contrasts with the Cholistan region, where Hakra settlements were spread across a more arid environment and included a large proportion of temporary camps adapted to fluctuating water availability (Mughal, 1990). In Haryana, by contrast, the relatively stable alluvial environment appears to have encouraged repeated or longer-term occupation.

5.2. Distribution of Hakra Sites in Haryana

The eastern extent of the Hakra cultural horizon is represented by a cluster of protohistoric settlements located within the Ghaggar–Chautang interfluve of present-day Haryana. Major sites associated with Hakra Ware assemblages include Bhirrana in Fatehabad District, Kunal in Hisar District, Farmana and Girawad in the Rakhigarhi region, as well as Burj and related smaller settlements identified through regional exploration. These sites are consistently situated on slightly elevated ground adjacent to palaeochannels or relict river courses, reflecting deliberate selection of locations that combined access to water, cultivable soils, and grazing land.

Excavations at Bhirrana and Kunal have revealed early cultural levels characterized by Hakra ceramics, pit-dwellings, hearths, and associated occupational debris, indicating established habitation rather than ephemeral use. At Farmana, the earliest strata underlying the Mature Harappan settlement contain pits and cultural deposits attributable to the Hakra phase, demonstrating continuity of occupation across cultural periods. Survey evidence from the wider Ghaggar basin shows that these settlements occur in localized clusters rather than in isolation, suggesting interaction among communities occupying the same ecological corridor.

The spatial pattern of these Haryana sites contrasts with the more dispersed distribution observed in Cholistan and instead reflects settlement anchored to agriculturally productive landscapes. Their

placement along stable alluvial tracts indicates an orientation toward repeated occupation and localized resource exploitation, forming a regional settlement system that represents the eastern expression of the broader Hakra cultural network.

5.3. Cultural Characteristics and Material Indicators

The identification of these settlements' rests largely on ceramic typology. Diagnostic forms include mud-appliqué vessels, incised wares, chocolate-slipped pottery, and related ceramic traditions that distinguish Hakra assemblages from later Early Harappan material (Keserwani & Kumar, 2013). Excavations at major sites further reveal habitation features such as pits, hearths, and domestic activity areas, suggesting communities transitioning toward semi-sedentary lifeways (Parmar & Shinde, 2011).

5.4. Settlement Organization and Environmental Adaptation

The spatial arrangement of Hakra sites in Haryana reflects a dual orientation toward fertile riverine plains and nearby upland resource zones. Access to cultivable land, pasture, and raw materials would have supported a mixed agro-pastoral economy, while proximity to Aravalli-derived resources facilitated craft and tool production (Parmar & Shinde, 2011). Such settlement placement suggests deliberate adaptation to diverse ecological niches rather than reliance on a single subsistence strategy.

In contrast to the more dispersed and mobile pattern observed in Cholistan, the Haryana distribution indicates increasing settlement stability and repeated occupation of favourable locales. This shift may represent an important developmental stage in which early communities experimented with agriculture, resource exploitation, and localized exchange systems, laying the groundwork for the socio-economic transformations that culminated in the Early Harappan period.

6. SETTLEMENT CHARACTERISTICS AND STRUCTURAL EVIDENCE

The settlement pattern associated with the Hakra phase demonstrates considerable regional variation, reflecting differences in environmental setting and resource availability across the Ghaggar–Hakra domain. Archaeological evidence indicates that Hakra settlements were typically established in close proximity to water sources, particularly along active or relict river channels, where access to cultivable land, pasture, and raw materials could be maintained simultaneously. This locational preference is clearly visible in both Cholistan and Haryana, although the nature of occupation differs markedly between the two regions.

In the Cholistan Desert, Hakra sites are predominantly small and dispersed, occurring along the dry bed of the Hakra River and its associated palaeochannels. Survey data show that many of these sites consist mainly of surface artefact scatters, including ceramics and lithic materials, with little or no preserved structural architecture (Mughal 1990; Dogar & Sadique 2022). The absence of substantial building remains suggests the use of light, perishable construction materials such as reeds, brushwood, or mud-plastered frameworks that have not survived archaeologically. Such settlement signatures are consistent with short-term or seasonally shifting occupations adapted to a semi-arid environment where water availability was unpredictable.

The eastern distribution of Hakra culture in Haryana presents a more substantial record of habitation. Excavations at sites such as Kunal and Bhirrana have revealed pit-dwellings, hearths, storage pits, and prepared living surfaces, indicating organized domestic activity and repeated occupation (Parmar & Shinde 2011). These semi-subterranean structures represent a practical architectural response to local conditions, requiring limited construction resources while providing protection from climatic

extremes. Their recurrence across multiple sites suggests that pit-based habitation was a standardized feature of Eastern Hakra settlement organization.

Evidence from Farmana further illustrates the continuity of occupation in this region. Early cultural levels underlying the later Harappan settlement contain pits and associated cultural deposits, demonstrating that protohistoric habitation preceded and likely contributed to subsequent urban- phase development. This stratigraphic sequence indicates that Hakra communities established enduring settlement nodes that later expanded during the Early and Mature Harappan periods.

Regional survey work in the Ghaggar–Chautang basin also shows that many sites occur in clusters along stable alluvial tracts rather than being randomly distributed across the landscape (Singh et al. 2011; Garge 2014). Such clustering suggests deliberate settlement planning aimed at maximizing access to fertile soils and water resources while maintaining connectivity with nearby ecological zones, including the Aravalli uplands.

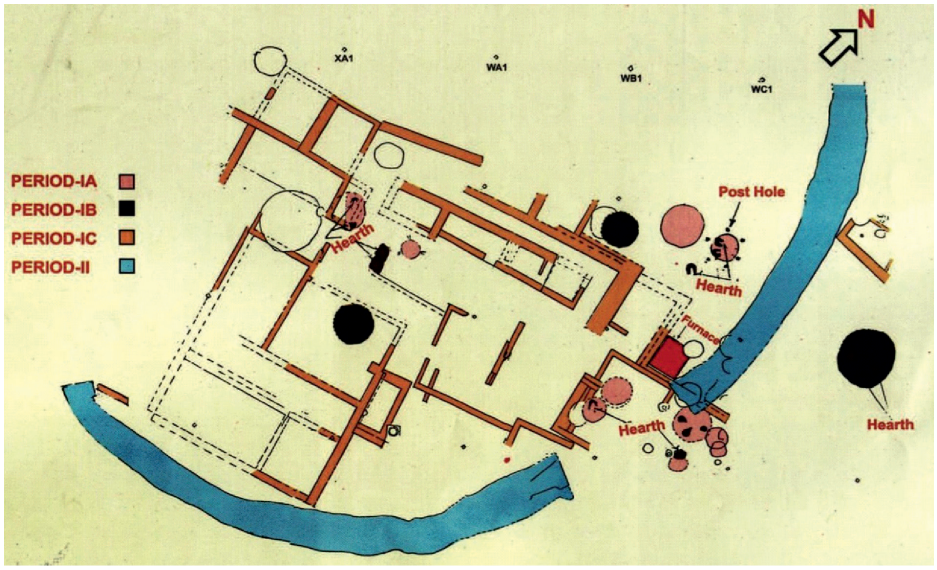

Figure 2: Pit Dwelling Complexes of the Site of Kunal (Courtesy: Acharya 2008)

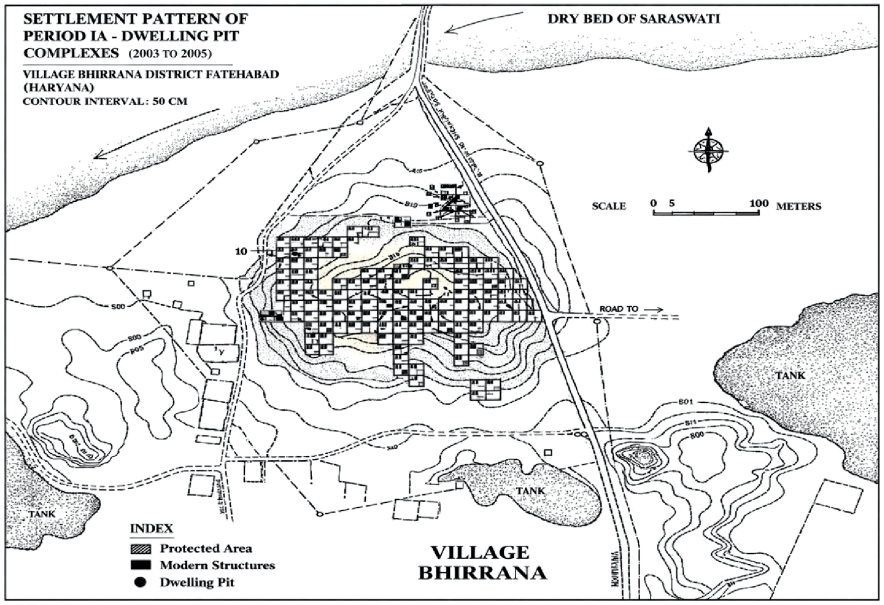

Figure 3: Pit Dwelling Complexes of the site of Bhirrana (Courtesy: Rao 2006)

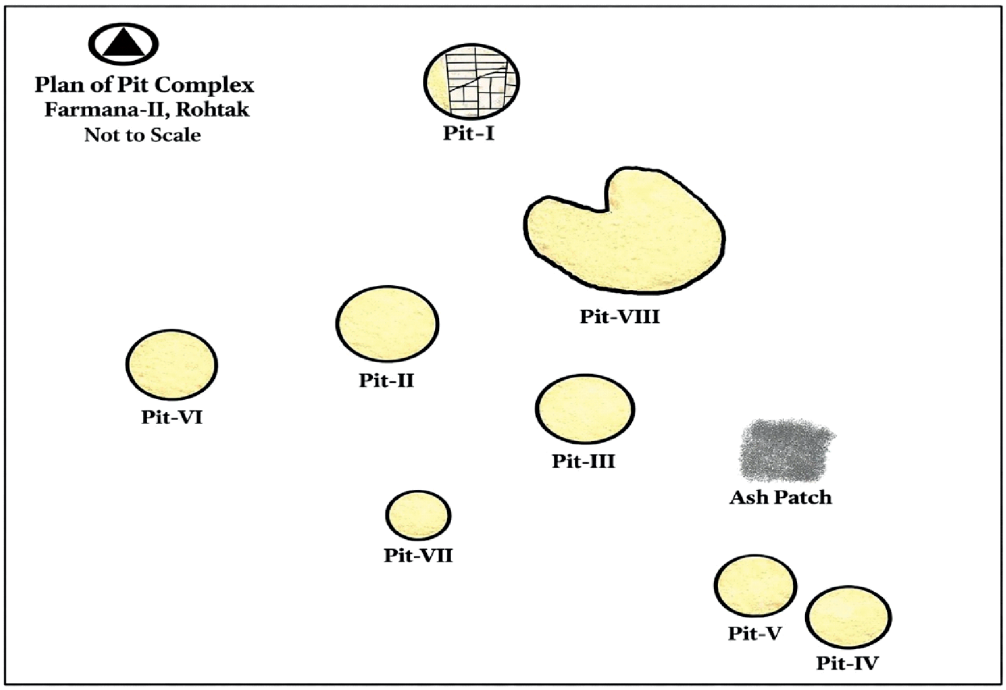

Figure 4: Pit Dwelling Complexes of the site of Farmana - II

Material culture recovered from these settlements further supports the interpretation of localized but stable habitation. The presence of Hakra Ware ceramics—characterized by red fabrics, mud-appliqué decoration, incised designs, and simple painted motifs—across multiple sites indicates a shared technological tradition and continuity of occupation within a connected cultural network (Keserwani & Kumar 2013). The widespread occurrence of these wares in domestic contexts suggests production and use at the household level rather than centralized manufacture.

Taken together, the structural and spatial evidence demonstrates that while Cholistan preserves a pattern of dispersed and lightly constructed settlements adapted to environmental uncertainty, Haryana exhibits more sustained habitation marked by pit-based dwellings, repeated occupation, and clustered site distribution. These characteristics indicate a shift toward increasing settlement stability and provide an important archaeological context for understanding the transition from Hakra-phase communities to the more organized village systems of the Early Harappan period.

7. SUBSISTENCE STRATEGIES AND RESOURCE ADAPTATION

The subsistence organization of Hakra communities in Haryana was shaped by the ecological setting of the Upper Sarasvati–Drishadvati basin, where riverine landscapes, fertile alluvium, and adjacent grazing tracts enabled a combined farming and herding economy. Settlement placement along palaeochannels indicates that access to water and cultivable soils formed the basis of subsistence planning rather than opportunistic occupation (Garge 2014; Singh et al. 2011).

7.1. Agricultural Foundations and Crop Diversity

Archaeobotanical evidence from early sites such as Kunal demonstrates the presence of wheat, barley, rice, lentil, field pea, and linseed, indicating a diversified agricultural system already established in the early phases of settlement (Saraswat & Pokharia 2002–03; Parmar 2014). Such crop diversity suggests planned cultivation rather than experimental agriculture.

Regional archaeobotanical syntheses further indicate the inclusion of hardy millets within early farming systems, reflecting adaptive strategies suited to semi-arid environments and seasonal rainfall variability (Pokharia et al. 2014). The coexistence of multiple crop types implies risk- buffering rather than reliance on a single staple.

Storage pits and associated processing installations at sites such as Kunal, Girawad, and Farmana demonstrate organized storage and food preparation activities, confirming that agricultural production was embedded in household-level subsistence practices (Parmar 2014).

7.2. Riverine Ecology and Agricultural Potential

The clustering of settlements along Ghaggar–Sarasvati palaeochannels shows deliberate exploitation of flood-replenished soils that required minimal irrigation. Levee formations offered elevated habitation surfaces, while adjoining floodplains provided cultivable land (Garge 2014).

This pattern differs markedly from Cholistan, where dispersed sites aligned with unstable channels indicate subsistence strategies involving greater pastoral mobility and less permanent agricultural investment (Mughal 1990; Dogar & Sadique 2022).

7.3. Agro-Pastoral Integration

Zooarchaeological evidence provides direct insight into the economic structure of these settlements. Faunal remains from excavated Haryana sites—including Kunal, Bhirrana, Rakhigarhi, Farmana, Girawad, and Masudpur—demonstrate the predominance of domesticated cattle, buffalo, sheep, goats, and pigs, supplemented by limited hunting of wild taxa (Ritu & Rajpal 2025).

At Bhirrana, early levels show a mixed faunal assemblage incorporating domesticated animals along with fish, birds, and wild mammals, indicating a broad-spectrum subsistence base characteristic of early agro-pastoral adaptation (Ritu & Rajpal 2025). Similar patterns at Kunal reveal organized butchery and consumption practices associated with cattle and small ruminants, suggesting integration of livestock management with cultivation activities.

These findings confirm that pastoralism remained central even where agriculture was practiced, forming a resilient economic system capable of supporting sustained habitation.

8. COMPARATIVE ANALYSIS: CHOLISTAN HAKRA AND HARYANA (EASTERN HAKRA) TRADITIONS

The comparison between the Cholistan Hakra region and its eastern extension into Haryana is central to understanding the adaptive variability within the Hakra cultural horizon. Rather than representing a monolithic cultural entity, the archaeological record demonstrates that Hakra communities developed regionally distinct settlement and subsistence strategies shaped by contrasting ecological settings. The Cholistan Desert represents the type-region where the culture was first recognized, while the Upper Sarasvati basin of Haryana illustrates a modified adaptation within a more favourable environmental niche.

8.1. Settlement Density and Spatial Organization

Extensive surveys in Cholistan documented nearly one hundred Hakra Ware sites distributed along the dry Hakra channel, many interpreted as temporary or seasonal encampments reflecting mobility within a semi-arid landscape (Mughal, 1990). The high number of small sites and their dispersed pattern suggest flexible occupation strategies linked to fluctuating water availability and pastoral movement.

In contrast, investigations in Haryana have identified a network of Hakra-related settlements aligned along the Saraswati–Drishadvati palaeochannels, including sites such as Bhirrana, Kunal, Farmana, Girawad, and Burj (Keserwani & Kumar, 2013). These sites show clearer evidence of repeated occupation and more stable habitation features, indicating a shift toward localized settlement clusters rather than dispersed camps.

Regional landscape surveys further confirm that settlement placement in Haryana correlates strongly with riverine geomorphology, soil fertility, and access to ecological resources, underscoring the role of environmental determinism in shaping habitation choices (Garge, 2014; Singh et al., 2011).

8.2. Environmental Context and Adaptive Strategies

The Cholistan Hakra settlements were situated within an environment that gradually became arid, requiring communities to adopt flexible agro-pastoral lifeways combining limited cultivation with pastoral mobility (Mughal, 1990). This ecological constraint fostered settlement fluidity and seasonal land use.

By contrast, the Upper Sarasvati basin offered comparatively stable alluvial plains, seasonal water retention, and diverse ecological niches, encouraging communities to invest in longer-term habitation and agricultural production (Parmar & Shinde, 2011). The clustering of settlements in fertile interfluves suggests deliberate selection of agriculturally productive landscapes rather than opportunistic occupation.

8.3. Architectural and Habitation Patterns

Archaeological evidence from Cholistan indicates that many Hakra sites are represented primarily by surface scatters of ceramics, lithics, and limited occupational debris, with very little preserved structural architecture. Survey documentation along the dry Hakra channel recorded numerous small campsites situated on stabilized sand dunes or palaeochannel margins, where durable building remains are either absent or extremely fragmentary, suggesting ephemeral construction techniques such as wattle-and-daub or light superstructures that have not survived archaeologically (Mughal, 1990; Dogar & Sadique, 2022). This pattern is consistent with short-term or seasonally shifting occupations adapted to a fluctuating riverine environment.

In contrast, excavations in Haryana—particularly at sites such as Kunal and Bhirrana—have revealed subsurface habitation features including pit-dwellings, storage pits, hearths, post-holes, and prepared floor surfaces. These features demonstrate repeated occupation and organized domestic space rather than temporary encampment (Parmar & Shinde, 2011). At several Ghaggar basin sites, the stratigraphic sequence shows successive habitation layers, indicating continuity of settlement over time (Singh et al., 2011). The presence of fixed activity areas, storage facilities, and ceramic assemblages associated with household use points toward a semi-sedentary settlement system supported by local agricultural production.

This archaeological contrast between largely non-structural Cholistan sites and the more clearly defined habitation evidence in Haryana suggests regional variability in settlement investment. While both regions share the Hakra cultural tradition, the eastern zone reflects increasing permanence in settlement organization, representing an important developmental stage preceding the nucleated village formations of the Early Harappan period.

8.4. Subsistence Systems and Agricultural Adaptation

The subsistence economy of Hakra communities was fundamentally structured around a mixed agro-pastoral system in which animal husbandry, limited cultivation, and the exploitation of local ecological

resources operated in close integration. Evidence from across the Ghaggar–Hakra domain indicates that these early populations adopted flexible subsistence strategies suited to semi- arid environments characterized by fluctuating water availability and variable rainfall. Archaeobotanical studies from the northwestern subcontinent have demonstrated the cultivation of diverse crops, including hardy cereals and drought-resistant millets, suggesting deliberate risk- buffering strategies designed to ensure food security under uncertain climatic conditions (Pokharia et al. 2014). Such diversification reflects an early stage of farming in which cultivation was combined with mobility and pastoral support rather than forming a fully sedentary agricultural regime.

In the Cholistan region, settlement distribution along palaeochannel levees indicates that subsistence was closely tied to seasonal water access. The predominance of small, dispersed sites suggests communities practiced a flexible economy combining herding with episodic cultivation in zones temporarily enriched by fluvial activity (Mughal 1990; Dogar & Sadique 2022). This pattern reflects adaptation to a landscape where river courses shifted and long-term agricultural investment was risky, encouraging strategies that balanced pastoral mobility with opportunistic farming.

In contrast, evidence from the eastern sector, particularly Haryana, reveals subsistence practices operating within a more stable environmental framework. Geoarchaeological studies of the Chautang–Ghaggar basin demonstrate the availability of fertile alluvial soils, accessible groundwater, and predictable floodplain niches, all of which would have supported repeated cultivation and longer settlement duration (Garge, 2014). Regional settlement surveys further confirm that protohistoric communities selected locations in proximity to relict channels and arable tracts, indicating a deliberate relationship between habitation and agricultural potential (Singh et al. 2011).

Zooarchaeological evidence from the earliest stratigraphic levels at sites such as Kunal and Bhirrana—securely associated with Hakra Ware deposits—demonstrates that domesticated cattle formed the backbone of the economy, accompanied by sheep, goats, and occasional pigs, while hunting and aquatic resources played supplementary roles (Ritu & Rajpal 2025). These assemblages belong specifically to the Pre-Harappan or Hakra-phase contexts and therefore illuminate subsistence patterns prior to the development of urban Harappan systems. At Bhirrana, the Hakra levels indicate a broad-spectrum subsistence base combining livestock management with the exploitation of fish, birds, and wild mammals, reflecting a transitional agro-pastoral adaptation rather than a specialized agrarian economy (Ritu & Rajpal 2025). Similar patterns observed in the earliest levels at Kunal reinforce the dominance of herding supported by localized cultivation and organized meat processing.

The combined archaeobotanical, faunal, and environmental datasets suggest that while Hakra communities across the greater region shared a common adaptive foundation, those in Haryana operated within an ecological niche that allowed greater continuity of occupation and gradual stabilization of food-production strategies. This does not represent an abrupt shift to sedentary agriculture but rather a process of subsistence intensification in which pastoral lifeways remained central even as cultivation became more regularized. Such developments foreshadow the economic organization of the Early Harappan period, where increasingly permanent settlements emerged upon the adaptive base established during the Hakra phase.

8.5. Resource Exploitation and Economic Diversification

Resource exploitation during the Hakra phase was closely conditioned by regional ecological settings, and the eastern distribution in Haryana reflects a broader and more stable resource base than that available in the Cholistan desert. The positioning of settlements within the Ghaggar– Chautang interfluve placed communities at the interface of fertile alluvial plains and the raw- material zones of

the Aravalli outcrops. This geographical location enabled access not only to cultivable land and pasture but also to stone, mineral, and semi-precious resources derived from upland formations, indicating a wider procurement network than that observed in the more environmentally constrained Cholistan sites (Parmar & Shinde 2011; Garge 2014).

Archaeological investigations in Haryana demonstrate that Hakra settlements were deliberately located to exploit multiple ecological niches simultaneously. Survey data show clustering of sites near palaeochannels as well as along routes leading toward the Aravalli belt, suggesting planned access to both subsistence and non-subsistence resources (Singh et al. 2011). Such locational choices imply that these communities were not isolated farming hamlets but participants in localized exchange systems through which lithic materials, clay sources, and possibly ornamental stones circulated between settlements.

Ceramic assemblages associated with Hakra contexts further illustrate technological organization and localized craft activity. The characteristic Hakra Ware pottery—comprising handmade and wheel-finished vessels, often treated with mud-appliqué, incised designs, and simple painted motifs—demonstrates a shared technological tradition across sites while also indicating household-level production rather than centralized specialization (Keserwani & Kumar 2013). The recurrence of similar ceramic forms at geographically dispersed settlements suggests knowledge transmission within a connected cultural network rather than independent local invention.

Faunal and subsistence evidence complements this picture by indicating the integration of pastoralism with craft and resource procurement activities. Herding practices would have enabled mobility across short distances, facilitating access to grazing lands as well as to raw-material zones, thereby linking subsistence routines with resource acquisition strategies (Ritu & Rajpal 2025). This integration of animal management, cultivation, and localized production reflects an economy organized around flexible resource use rather than single-resource dependence.

In contrast to Cholistan, where settlement systems appear strongly tethered to the uncertain availability of water along ephemeral channels, the Haryana region offered a more predictable environmental matrix that allowed sustained exploitation of both agricultural and mineral landscapes. The resulting economic structure can therefore be characterized as diversified but locally grounded, combining food production, herding, and small-scale craft activity within a stable settlement framework. Such an adaptive system provided the material and organizational foundation upon which the more complex economic arrangements of the Early Harappan phase later developed.

8.6. From Mobile Adaptation to Regional Sedentism: A Developmental Trajectory

Archaeological data from Cholistan and Haryana demonstrate clear differences in settlement organization within the broader Hakra cultural sphere. In the Cholistan Desert, surveys conducted along the dried Hakra river course documented nearly one hundred Hakra sites, most of which consist of small surface scatters with minimal architectural remains. Sites such as Jalilpur and other localities identified during regional surveys show ephemeral occupation signatures, suggesting temporary camps or short-term settlements adapted to fluctuating water availability (Mughal 1990; Dogar & Sadique 2022). Their placement on palaeochannel levees indicates close dependence on seasonal hydrological conditions rather than permanent habitation.

In contrast, excavated sites in Haryana provide evidence of more sustained occupation. At **Kunal**, the earliest cultural levels associated with Hakra Ware yielded pit-dwellings, storage pits, hearths, and structured activity areas, demonstrating repeated use of the same settlement space (Parmar & Shinde 2011). Similarly, **Bhirrana** has produced Hakra-phase deposits with habitation features and stratified

cultural layers, indicating continuity of occupation rather than temporary encampment. Survey work in the Ghaggar–Chautang basin also shows clusters of protohistoric sites located along stable relict channels, reflecting deliberate settlement in agriculturally favourable zones (Singh et al. 2011; Garge 2014).

Subsistence evidence supports this pattern of increasing stability. Faunal assemblages from Hakra-phase levels at sites such as **Kunal, Bhirrana, and Girawad** indicate reliance on domesticated cattle, sheep, and goats, supplemented by limited hunting and aquatic exploitation, reflecting an agro-pastoral economy capable of sustaining longer-term residence (Ritu & Rajpal 2025). The environmental advantages of Haryana—fertile alluvial soils, accessible water sources, and proximity to Aravalli raw-material zones—would have enabled communities to combine cultivation, herding, and resource procurement within a localized settlement framework.

These examples show that while Cholistan sites reflect dispersed and mobile adaptation to an unstable desert-river environment, Haryana sites demonstrate repeated occupation, investment in habitation features, and integrated subsistence practices. The eastern region therefore represents a stage in which Hakra communities increasingly adopted stable settlement systems that formed the basis for the more organized village patterns of the Early Harappan period.

9. DISCUSSION AND CONCLUSION

The comparative examination of Hakra-phase evidence from Cholistan and Haryana demonstrates that the cultural horizon identified as “Hakra” represents a shared material tradition expressed through regionally distinct settlement and subsistence systems rather than a uniform cultural pattern. Archaeological surveys in the Cholistan Desert documented a large number of Hakra sites distributed along the abandoned Hakra river course, most of which are represented by surface scatters, limited cultural deposits, and an absence of durable architectural remains (Mughal 1990; Dogar & Sadique 2022). Their location on palaeochannel margins indicates dependence on seasonal water regimes, suggesting short-term or recurrent occupations organized around pastoral movement and localized cultivation.

Excavated evidence from the eastern sector, particularly in Haryana, presents a contrasting settlement signature. At sites such as Kunal and Bhirrana, Hakra-phase strata contain pit- dwellings, hearths, storage pits, and successive occupational layers, demonstrating repeated habitation rather than ephemeral use (Parmar & Shinde 2011). Regional explorations across the Ghaggar–Chautang basin further show clustering of protohistoric sites along stable relict channels and fertile alluvial tracts, indicating deliberate settlement placement within agriculturally viable landscapes (Singh et al. 2011; Garge 2014). These spatial patterns reflect longer occupation spans and increased investment in habitation space.

Material culture and production practices reinforce this regional distinction. Hakra Ware pottery—characterized by handmade and wheel-finished vessels with mud-appliqué, incised, and simple painted treatments—occurs consistently across Haryana sites, demonstrating technological continuity within a localized production system (Keserwani & Kumar 2013). Access to lithic and mineral resources from the Aravalli outcrops, combined with alluvial clay sources, suggests that eastern Hakra settlements operated within a broader but regionally focused resource catchment (Parmar & Shinde 2011).

Subsistence reconstruction from Hakra-phase contexts in Haryana provides further insight into this stabilization process. Faunal assemblages from early levels at Kunal, Bhirrana, and related sites indicate a predominance of domesticated cattle, sheep, and goats, supplemented by limited hunting and aquatic exploitation, reflecting an agro-pastoral economy capable of sustaining longer-term occupation

(Ritu & Rajpal 2025). Archaeobotanical studies across the wider region identify diversified crop regimes, including millets and other cereals adapted to semi-arid conditions, demonstrating flexible agricultural strategies designed to mitigate environmental risk (Pokharia et al. 2014).

When viewed together, these datasets indicate that Cholistan preserves evidence of a dispersed settlement system closely aligned with hydrological instability, whereas Haryana represents a zone where the same cultural tradition was reorganized within a more predictable ecological framework. The Upper Sarasvati–Drishadvati basin provided cultivable soils, accessible water sources, and proximity to upland raw materials, conditions that encouraged repeated occupation, integration of herding with cultivation, and the gradual consolidation of village-scale settlement.

The archaeological significance of Haryana Hakra sites therefore lies in documenting a stage of regional stabilization within the broader protohistoric sequence. Rather than marking a simple geographic extension of Hakra culture, the evidence records how communities adapted their settlement organization, subsistence economy, and resource use to local environmental opportunities. This adaptive transformation forms an important antecedent to the nucleated settlements and increasingly structured economic systems characteristic of the Early Harappan period.

In this perspective, the Hakra phenomenon should be understood as a mosaic of regionally conditioned adaptations across the Ghaggar–Hakra basin. The Haryana evidence captures the material processes—settlement continuity, agro-pastoral integration, and localized production—that contributed to the emergence of more complex socio-economic formations in the third millennium BCE, providing a critical link between early farming communities and later Harappan cultural development.

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