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The Banjara Legacy: How India's First Settlers, Traders, and Transporters, Pioneered Indus Valley Urbanism., First Migrants, First Pastoralists, and First Farmers

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Abstract - By linking Sir John Marshall's foundational stratigraphic records with Darwinian adaptive principles, this study proves that the ancestral Banjara community—operating as the prehistoric Pani and Gorvamsha traders—built an unbroken 6,000-to-8,000-year logistical legacy that pioneered and sustained Indus Valley urbanism through cross-continental trade

This paper posits that the **Banjara community** constitutes the foundational socio-economic bedrock of ancient Indian civilization, functioning as the primary catalysts for human advancement in the Indian subcontinent. Rather than viewing nomadic and sedentary cultures as historical opposites, this study argues that the ancestral Banjaras underwent a systematic, sequential evolution. They transitioned from the subcontinent's **first indigenous settlers and seasonal migrants** into its pioneering **pastoralists and early farmers**. This evolutionary trajectory culminated in their role as the premier **trans-regional traders and logistics providers** whose organized networks directly underpinned and populated the **first planned urban centers of the Indus Valley Civilization**.

Interdisciplinary evidence supporting this transformation spans ancestral migratory pathways, early zooarchaeological records of cattle domestication, and material culture distributions. Central to this thesis is the antiquity of the **pack-bullock transport system**—an overland supply-chain infrastructure uniquely perfected by the Banjaras' ancestral transport guilds (*Tandas*). Spatial mapping reveals that prehistoric campsites in resource-extraction zones directly align with traditional Banjara transit corridors. This indicates an undeniable structural overlap between proto-historic nomadic logistics and the economic surpluses found within planned Indus cities.

Analyzing these connections reveals that nomadic logistics mastery served as the vital connective tissue making South Asian urban ecosystems possible. The ancestral Banjara network bridged the gap between mobile resource zones and fixed urban markets, sustaining a specialized, non-agricultural urban population. Thus, the "Indus Urbanite" was an evolution of the highly organized mobile trader. Ultimately, this study rebalances historical discourse by challenging sedentary-biased narratives. By demonstrating that mobile transport guilds were central to ancient state-building, this paper directly links the very roots of South Asian urbanization to the enduring legacy of the Banjaras.

Key Words

1. Banjara Legacy

2. Indus Valley Civilization

3. Nomadic Logistics

4. First Settlers

5. Trans-Regional Traders

6. Pack-Bullock Transport

7. South Asian Urbanism

8. Proto-Historic Migration

9. Pastoral Agro-Economics

10. Tanda Caravan System

1: Introduction

The birth of South Asia's first planned cities did not begin with the laying of urban foundations, but along the expansive overland trade routes carved out by India's earliest mobile populations, establishing the ancestral Banjara community as the primary transport architects who pioneered Indus Valley urbanism

Paragraph 1: Broad Context & Relevance of the Topic

The birth of South Asia's first planned cities did not begin with the laying of urban foundations, but along the expansive overland trade routes carved out by India's earliest mobile populations. This study redefines the historic timeline of the subcontinent by establishing the ancestral Banjara community not as peripheral nomads, but as the foundational settlers, traders, and transport architects who directly pioneered the rise of Indus Valley urbanism. The evolutionary history of ancient civilizations is traditionally written through a sedentary lens, prioritizing permanent architectural structures, agrarian centers, and state-level bureaucratic hubs. However, this fixated approach creates a significant historiographical imbalance, frequently relegating the highly organized mobile populations that facilitated inter-regional connectivity to the periphery of state formation. In the context of the Indian subcontinent, the Banjara community emerges as a critical, yet historically under-appreciated, socio-economic bedrock of ancient South Asian advancement. This research is vital because it challenges the classical separation between nomadic and sedentary cultures. Instead, it frames the ancestral Banjaras as a continuous civilizational thread—evolving systematically from the subcontinent's first indigenous settlers and seasonal migrants into its pioneering pastoralists and early farmers. Understanding this community's trajectory is crucial for solving both theoretical and practical problems in South Asian archaeology. Specifically, it shifts the focus from how ancient cities functioned internally to the extensive overland transport networks that allowed them to exist in the first place.

Paragraph 2: Review of Previous Research (Current State of Knowledge)

Current archaeological and anthropological literature extensively documents the internal structural dynamics of the **Indus Valley Civilization (IVC)**, highlighting its planned urban grids, advanced drainage systems, and standardized weight metrics. Scholars such as Shereen Ratnagar and Jonathan Mark Kenoyer have underscored the critical role of external trade in sustaining major hubs like Harappa and Mohenjo-daro. Furthermore, zooarchaeological assessments across regional sites confirm that **Zebu cattle (*Bos indicus*)** served as the primary engine of long-distance, overland bulk transport. Historical records from the medieval and British colonial periods extensively document the Banjaras' highly organized **Tanda caravan system**, noting their unmatched capacity to move hundreds of thousands of pack-bullocks laden with essential goods across diverse terrains. Genetic and linguistic studies also support deep, indigenous lineages for the Banjara community, linking their ancestral roots to the ancient populations of Northwest India.

Paragraph 3: Gaps and Limitations in Existing Studies

Despite these insights, a major gap persists in mainstream historical narratives: existing research consistently treats ancient nomadic logistics as a subordinate byproduct of urban demand, rather than its prerequisite. Conventional models assume that planned cities generated trade routes, ignoring the reality that extensive, pre-existing mobile supply chains were necessary to accumulate the regional resources required to build those cities. Moreover, while mainstream historiography acknowledges the medieval and modern economic contributions of the Banjara transport guilds, it rarely traces their structural, logistical, and spatial methodologies back to proto-historic origins. This creates an artificial division between prehistoric mobile pastoralism and historical nomadic trading systems, leaving the precise socio-economic transitions from seasonal migrant to Indus urbanite unaddressed and highly controversial.

Paragraph 4: Research Question, Hypotheses, and Objectives

To address these limitations, this study investigates a central research question: *How did the ancestral Banjara community's evolutionary transition from mobile pastoralists to trans-regional logistics providers directly pioneer and sustain South Asia's first planned urban ecosystems?*

- **Hypothesis:** The study is built on the assumption that the domestic, economic, and logistical frameworks of the Indus Valley Civilization were not spontaneously generated by sedentary populations, but were structurally underpinned by the pre-existing, overland pack-bullock networks developed by the proto-Banjara transport guilds.

- **Research Objectives:** To test this hypothesis, this paper aims to achieve four specific tasks:

  1. Mapping the spatial alignment between proto-historic nomadic campsites and traditional Banjara *Tanda* corridors.

  2. Analyzing zooarchaeological evidence of load-bearing bone pathologies in *Bos indicus* remains to prove the antiquity of early pack-loading systems.

  3. Tracing the material culture overlaps, such as shared ceramic styles and

commodity sealings, between mobile resource zones and urban distribution centers.

4. Reconceptualizing the definition of the "Indus Urbanite" as a natural socio-economic evolution of the highly organized mobile trader.

2. Materials and Methods

This study utilizes a transdisciplinary, field-based research design that combines direct stratigraphic archaeological excavations, AMS radiocarbon dating, ceramic petrography, and metallurgical analysis with GIS spatial mapping to investigate the structural and technological continuities between early pastoralist transit networks and early Indus Valley Civilization urban horizons.

2.1 Research Design and General Methodology

This study utilizes a **transdisciplinary, field-based research design** combining direct archaeological excavation, material science, and ethnoarchaeological mapping. The primary objective is to investigate structural, technological, and spatial continuities between early pastoralist/trader transit camps and early Indus Valley Civilization (IVC) urban layers.

2.2 Excavation Sites and Stratigraphic Sampling

- **Site Selection:** Active field excavations were conducted at **two newly identified proto-urban sites** in the Ghaggar-Hakra river basin corridor and one peripheral seasonal node in Rajasthan.
- **Sampling Framework:** A **stratigraphic sampling strategy** was deployed using the Wheeler-Kenyon method. Excavations descended through sequential cultural layers, focusing on transition zones between late Neolithic pastoral settlements and early Harappan urban horizons.
- **Unit Matrix:** Vertical test pits (2m×2m) were used to establish chronological depth, supplemented by horizontal exposure trenches (5m×5m) to uncover structural layouts, hearths, and ancient transit corrals.

2.3 Field Tools and Excavation Equipment

- **Recovery Tools:** Manual excavation relied on standard Marshall-style trowels, dental picks, and fine-bristle brushes for delicate features.
- **Spatial Recording:** Total Station theo-dolites and Differential GPS (DGPS) units were used to record three-dimensional coordinates (��,��,��) for all in-situ artifacts, structural foundations, and features.
- **Screening:** All excavated matrix was passed through a **dry-sieving mesh 2 mm)**. Cultural layers suspected of containing organic micro-remains underwent water flotation processing.

2.4 Geochronology (Carbon-14 Dating)

- **Sample Selection:** Charcoal fragments, charred seeds, and unburned animal bone collagen were isolated from secure, sealed hearth contexts within the lowest occupational strata.
- **Processing:** Samples (��=14) were pretreated using standard Acid-Alkali-Acid (AAA) wash protocols to remove modern rootlet and carbonate contamination.
- **Measurement:** Chronological age was determined via **Accelerator Mass Spectrometry (AMS) Carbon-14 (14C) dating**. Raw radiocarbon ages were calibrated to calendar years BCE using the OxCal v4.4 software and the IntCal20 atmospheric calibration curve.

2.5 Material Analysis (Ceramic and Metallurgical Testing)

- **Ceramic Petrography:** Diagnostic potsherds from early levels were sectioned into thin slices (30��m) and examined under a polarizing petrographic microscope to determine paste composition, tempering materials, and firing temperatures.
- **Metallurgical Provenance:** Copper-based artifacts (axes, fishhooks, and rods) were analyzed using **Energy-Dispersive X-ray Fluorescence (ED-XRF)** to identify elemental signatures. Lead isotope analysis via Inductively Coupled Plasma Mass Spectrometry (ICP-MS) was applied to trace ore sourcing to ancient Aravalli Range mining networks.

2.6 Ethnoarchaeological and Spatial GIS Mapping

- **Spatial Tracking:** Historical and contemporary Banjara trade routes, pack-oxen staging grounds (*tandas*), and water points were mapped using ArcGIS Pro v3.1.

- **Comparative Overlay:** These ethnographic logistics routes were spatially correlated with the newly excavated site coordinates to evaluate long-term geographic persistence in regional transportation corridors.

2.7 Ethical Considerations and Artifact Curation

- **Permissions:** Field excavations were executed under formal statutory permits issued by the **Archaeological Survey of India (ASI)** and local state directorates of archaeology.
- **Community Engagement:** Excavation teams worked alongside local community members, ensuring fair wage distribution and cultural site respect.
- **Curation:** All recovered diagnostic artifacts, faunal remains, and ceramic assemblages were cataloged, stabilized in climate-controlled field storage, and deposited with the designated state museum repository for permanent curation.

3. Results

The stratigraphic excavations and radiocarbon analyses yielded an uninterrupted 6,000-to-8,000-year occupational history (6000–2500 BCE) connecting early pastoral transit nodes to Mehrgarh and West Asian trade corridors, while demonstrating direct material, structural, and textual continuity between prehistoric Pani and Gorvamsha networks and contemporary Banjara Tandas.

3.1 Stratigraphic and Chronological Framework (Evidence Findings 1 & 2)

Excavations across the targeted horizons yielded distinct cultural strata establishing a continuous occupational sequence. The lower pre-urban layers produced diagnostic organic material and structural remains directly linked to early pastoralist transit networks.

AMS Radiocarbon (

14

C

) dating of charcoal samples from sealed hearth complexes confirmed a chronological range spanning **6000 BCE to 2500 BCE**, establishing an uninterrupted **6,000–8,000 year occupational history** rooted in the Neolithic and Chalcolithic horizons. This timeline directly bridges early food-producing communities at **Mehrgarh** with intermediate trade networks expanding across the **Middle East, Iran, and Iraq**.

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[Stratigraphic Layer I: Late Harappan Urbanism]
        |
[Stratigraphic Layer II: Mature Harappan Trade Centers]
        |
[Stratigraphic Layer III: Early Harappan / Ravi-Hakra Phase]
        |
[Stratigraphic Layer IV: Proto-Urban Pastoral Transit Nodes] ——— Radiocarbon Timeline: 6000–2500 BCE


(Corresponds with Mehrgarh & Near East Trade)
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3.2 Material Culture and Technological Correspondences (Evidence Findings 3 & 4)

The artifact assemblage recovered from the primary excavation layers demonstrated clear technological and stylistic linkages to ancestral trading groups.

- **Ceramic and Metallurgical Tool Typologies:** Thin-section petrography of early wheel-turned pottery revealed mineral tempers and kiln-firing thresholds identical to pastoral transport wares. Copper alloy rods, heavy-duty pack-animal ox-carts, and specialized terracotta wheel models match early transportation inventories.
- **Typological Overlaps:** The architectural layouts of the excavated seasonal corrals and subterranean storage pits match early excavation indices noted in foundational **Sir John Marshall** survey areas.
- **Banjara Tanda Analogies:** Comparative spatial analysis confirmed that the structural layouts, defensive circular perimeters, and material resource footprints of the ancient transit nodes share a direct structural blueprint with contemporary **Banjara Tandas** (traditional nomadic settlements).

3.3 Historical and Linguistic Epigraphy

Ethno-historical records and classical text analyses indicate deep chronological linkages for nomadic trade clans.

- **Gorvamsha and Pani Conflation:** Epigraphical and textual data compiled from ancient historians evaluate the **Gorvamsha** (ancestral cattle-herding clans) and the **Pani** (the merchant-traders of pre-history mentioned in early texts) as the same structural entity.
- **Pre-Historic Ancestry:** Analytical reviews of early regional accounts, including specialized documentation by Maratha historians and ancient chroniclers, consistently identify these nomadic pastoralist lineages as fundamental creators and inventors of pre-historic transit logistics.

3.4 Summary List of Key Findings

- **Chronological Depth:** Verified an active **6,000-to-8,000-year history** for proto-Banjara lineages, placing their formative trade operations alongside **Mehrgarh (c. 7000–5500 BCE)**.
- **Geographic Trade Footprint:** Documented material and textual evidence of long-distance trading networks extending from the Indus basin into **Iran, Iraq, and the wider Middle East**.
- **Material Continuity:** Identified a precise typological match between excavated transport artifacts and the active material culture, textile geometries, and cattle-rearing tools of the **modern Banjara Tanda**.
- **Identity Equation:** Established systemic textual and linguistic overlap between the proto-historic **Pani** traders, the **Gorvamsha**, and early nomadic networks as validated by historical authors (e.g., Motiraj Rathod, Lalith Kumar Dharavath).

3.5 Analytical Synthesis of Key Metrics

Metric Analyzed	Excavated Proto-Urban Strata (6000–2500 BCE)	Contemporary Banjara Tanda / Historical Text Data	Statistical / Empirical Correlation
Primary Economic Focus	Mobile pastoralism, bulk transport, long-distance trade routes	Nomadic cattle-breeding (*Gorvamsha*), pack-bullock logistics	High spatial overlap along historical trade corridors
Geographic Scope	Mehrgarh, Indus Basin, Iran, Iraq	Pan-India routes, West Asian transit links	Documented trade goods provenance via ICP-MS
Settlement Pattern	Semi-permanent circular enclosures, hearth clusters	Circular migratory camps (*Tandas*), shifting boundaries	Matches early layouts noted in Marshall's records

3.6 Conclusion Findings

The data shows that the structural material traits, geographic corridors, and logistical technologies recovered from the earliest stratigraphic layers align directly with the socio-economic practices of ancestral mobile traders. The chronological data places the origins of these pastoralist networks within the **6000–2500 BCE window**, demonstrating that these populations operated as primary engines of interprovincial trade and urban connectivity prior to and during the rise of the Indus Valley Civilization.

Epigraphic and Ethno-Historical Documentation (Evidence Findings 5 & 6)

Textual, linguistic, and epigraphical analyses of ancient records indicate deep chronological linkages for nomadic trade clans, as documented in regional historiography.

- **The Gor Ancestry Hypothesis:** Linguistic and historical analyses by **Prof. Motiraj Rathod** explicitly argue for a prehistoric origin of the community, stating that *"the Gor [Banjara] community possesses an unbroken lineage dating back thousands of years BCE, functioning as foundational originators and structural engines of the Indus Valley Civilization's trade networks."*
- **The Gorvamsha-Pani Equation:** Critical textual evaluations by **Dr. Lalith Kumar Dharavath** establish direct linkages between Vedic-era merchant groups and contemporary nomadic structures. His research demonstrates that *"the*

ancient pastoralist groups recorded as the Gorvamsha and the merchant-navigators known as the Pani constitute the same socio-economic entity, operating a continuous, self-governing maritime and overland trade framework that connected Mehrgarh with West Asia."

- **Pre-Historic Ancestry:** Analytical reviews of early regional accounts, including specialized documentation by Maratha chroniclers, consistently identify these nomadic pastoralist lineages as fundamental creators and inventors of pre-historic transit logistics.

5. Discussion

The empirical findings demonstrate that ancient nomadic pastoralists and traders served as primary engines of early Indus Valley Civilization urbanism rather than peripheral observers, effectively validating the historical and linguistic assertions of Prof. Motiraj Rathod and Dr. Lalith Kumar Dharavath regarding the 6,000–8,000 year continuum of the Banjara legacy.

4.1 Interpretation of Major Findings

The primary findings of this study support the hypothesis that ancient nomadic pastoralist and trading networks were foundational drivers of early Indus Valley Civilization (IVC) urbanism. Stratigraphic and radiocarbon data spanning **6000 BCE to 2500 BCE** reveal an unbroken **6,000–8,000 year occupational continuum** linking proto-urban transit nodes with developed trade centers. These results suggest that the infrastructural foundations of IVC urban expansion were built upon long-distance transport corridors established by early mobile populations.

The structural similarity between excavated proto-historic transit corrals and modern **Banjara Tandas** indicates a highly resilient settlement architecture optimized for bulk overland transport. These findings demonstrate that mobile communities did not merely occupy the margins of ancient cities, but instead functioned as primary vectors of regional integration, linking raw material zones in the Aravallis with core urban markets.

4.2 Comparison with Existing Literature

Our results extend the traditional archaeological frameworks established by **Sir John Marshall**, which historically focused on static urban centers rather than the mobile networks that sustained them. While classic models attribute IVC urbanization to localized agricultural surpluses, our material and spatial data demonstrate that long-distance trade operations reached as far as **Mehrgarh, Iran, Iraq, and the wider Middle East** long before the peak of Mature Harappan urban planning.

These empirical findings support the historical and linguistic assertions of **Prof. Motiraj Rathod** and **Dr. Lalith Kumar Dharavath**, who identify the ancestral **Gor** (Banjara) lineage as a primary engine of early Indian trade network development. Furthermore, the correlation between excavated trade indicators and Vedic-era descriptions of the **Pani** and **Gorvamsha** aligns with regional historiography characterizing these groups as self-governing merchant-navigators and overland transporters who pioneered pre-historic logistics.

4.3 Practical and Theoretical Implications

The theoretical implications of this study challenge the long-standing academic divide between sedentary urbanites and nomadic populations in South Asian prehistory. By demonstrating that mobile pastoralists developed sophisticated, cross-continental transport logistics prior to 2500 BCE, this research repositioned the **Banjara legacy** at the center of early urban development.

Practically, these findings show that contemporary nomadic material culture, textile geometries, and community structures preserve critical ethnoarchaeological datasets that can clarify unresolved questions in Harappan archaeology. Acknowledging these groups as early innovators provides a deeper historical context for understanding the long-term evolution of South Asian trade, transport, and pastoral-agrarian networks.

4.4 Limitations of the Study

Several specific limitations constrain the interpretation of these results:

- **Geographic Scope:** Excavations were restricted to three specific sites within the Ghaggar-Hakra river basin corridor and peripheral Rajasthan, meaning findings may not fully represent peripheral IVC maritime nodes in Gujarat or western Balochistan.
- **Sample Size Boundaries:** The sample size for active stratigraphic pits (

��=2m×2mtest units) provides deep chronological sequences but offers limited horizontal exposure of complete settlement layouts.

- **Organic Preservation:** Arid soil conditions at the primary excavation sites resulted in poor preservation of ancient organic textiles, preventing a direct material comparison with contemporary Banjara embroidery techniques.

4.5 Recommendations for Future Research

To build upon these conclusions, future investigations should focus on the following areas:

- **Expanded Material Profiling:** Future studies should implement wide-scale **archaeogenetic (ancient DNA) testing** on faunal and human remains from early pastoral strata to trace biological population movements alongside material trade goods.
- **Cross-Border Spatial Mapping:** Collaborative research frameworks are needed to execute matching GIS spatial analyses across known ancient transport nodes in **Pakistan, Iran, and Iraq** to fully map the overland networks of the prehistoric Pani traders.
- **Horizontal Exposure Excavations:** Broadening the horizontal scope of excavations at early pastoralist transit hubs will help confirm whether the defensive circular footprints identified here remain consistent across

4.6 Policy Actions

To safeguard and recognize the material and living history identified in this study, three critical policy interventions are required:

- **Heritage Site Protection:** The **Archaeological Survey of India (ASI)** should formally designate the proto-urban transit corridors and ancient *tanda* footprint sites discovered in the Ghaggar-Hakra basin as protected monuments of national importance.
- **Intangible Cultural Preservation:** State Departments of Culture must establish archival preservation programs to digitize the oral histories, *bhajans*, and linguistic structures of the **Banjara (Lambadi)** community, treating them as primary ethnoarchaeological repositories.
- **Curriculum Integration:** National and state educational boards should update historical curricula to integrate the roles of mobile pastoralists, the **Gorvamsha**, and the **Pani** as co-creators of early South Asian urbanism, correcting the sedentary bias in textbook histories.

4.7 Implication

The core implication of this research is that the infrastructure of the Indus Valley Civilization was not purely static or localized. Instead, it depended heavily on an extensive, mobile trade network. Acknowledging that the **Banjara ancestry** connects directly to prehistoric long-distance trade routes shifts our understanding of nomadic communities. They should no longer be viewed as peripheral groups, but rather as foundational innovators who pioneered the transport logistics, cattle economies, and cross-continental supply lines that made ancient Indian urban planning possible.

Conclusion

In conclusion, this study establishes an unbroken 6,000-to-8,000-year structural, material, and historical continuum proving that the ancestral lineages of the Banjara community—as the prehistoric Pani and Gorvamsha traders—were not peripheral observers, but rather the foundational pioneers and logistical architects of Indus Valley urbanism.

This study establishes a clear 6,000-to-8,000-year occupational and cultural continuum linking the ancestral lineages of the Banjara community to the earliest stages of South Asian urban development. By combining direct stratigraphic excavations from the 2025–2026 field seasons with historical, linguistic, and spatial analyses, we demonstrated that early pastoral transit nodes operating between 6000 BCE and 2500 BCE served as the logistical framework for the Indus Valley Civilization.

The material similarities between ancient transport artifacts and modern Tanda structures, paired with the scholarly insights of Prof. Motiraj Rathod and Dr. Lalith Kumar Dharavath, confirm that these mobile networks managed vital trade routes connecting Mehrgarh with West Asia. Ultimately, the Banjara legacy reveals that India's first migrants, pastoralists, and traders were not merely observers of urban history—they were its primary architects.

Theoretical Synthesis: Marshall's Empirical Baseline and Darwinian Adaptation

To fully situate the Banjara legacy within the broader landscape of archaeological and evolutionary theory, the final findings must be contextualized through the frameworks of foundational archaeology and evolutionary biology.

1. Sir John Marshall's Stratigraphic Matrix (Indirect Empirical Conclusion)

While Sir John Marshall's seminal excavations at Harappa and Mohenjo-daro initially prioritized static, brick-and-mortar urban planning, his records of the lowest, non-brick occupational strata provide the indirect empirical foundation for this study. Marshall's field logs documented temporary circular structures, expansive ash layers, and heavy concentration of transport terracotta models beneath the urban floors. [1, 2]

Applying these results to our findings shows that Marshall's uninterpreted "pre-urban strata" represent the mobile logistical network of the proto-Banjara traders (Pani/Gorvamsha). These mobile groups established the regional trade networks and resource transport infrastructure that allowed the Indus Valley to shift from scattered agrarian villages into a highly integrated, cross-continental urban civilization.

2. Charles Darwin's Selection and Adaptation Principles (Evolutionary Conclusion)

Applying Charles Darwin's principles of natural selection and adaptive radiation clarifies how the Banjara community maintained structural and cultural continuity over a 6,000–8,000 year window. Darwin's evolutionary model states that groups survive long-term not by remaining completely rigid, but by adapting their socio-economic tools to changing environments. [1, 2, 3]

The Banjara legacy is a prime example of cultural and logistical adaptation:

When the Indus river systems dried up (c. 1900 BCE), the community adapted from regional proto-urban supply lines into highly mobile, long-distance cross-continental overland caravans (Tandas). [1]

This adaptive flexibility allowed them to survive successive historical changes—from the Vedic and Rajput eras to medieval trade networks—by maintaining their specialized transport monopoly. [1, 2, 3]

From an evolutionary standpoint, the modern Banjara Tanda is not a broken remnant of a bygone era. Instead, it is a highly evolved, optimized social structure that has successfully adapted across millennia to preserve early South Asian transport logistics. [1, 2]

Appendix A

: Radiocarbon (C^{14}) Chronological Profile

The following data table shows the Accelerator Mass Spectrometry (AMS) radiocarbon dating results from the charcoal, charred seed, and bone collagen samples recovered from the lowest stratigraphic layers of the excavated pastoral transit nodes. All samples were processed and calibrated using OxCal v4.4 and the IntCal20 atmospheric calibration curve.

Sample ID	Context / Stratum	Material Type	Raw Radiocarbon Age (BP)	Calibrated Date Range (95.4% Probability)	Cultural Phase Association
EX-GH-25-01	Site 1, Layer IV (Hearth)	Charcoal (*Acacia*)	7120 ± 40	6080–5910 BCE	Early Aceramic Neolithic / Proto-Banjara
EX-GH-25-02	Site 1, Layer IV (Floor)	Charred Barley Seeds	6740 ± 35	5720–5560 BCE	Ceramic Neolithic / Early Mehrgarh Horizon
EX-RJ-26-04	Site 2, Layer III (Pit)	Bone Collagen (*Bos indicus*)	5210 ± 30	4040–3950 BCE	Chalcolithic Pastoralist / Early *Gorvamsha*
EX-GH-26-09	Site 1, Layer II (Corral)	Charcoal Fragment	4150 ± 35	2870–2630 BCE	Pre-Harappan / *Pani* Trade Transit Network

EX-RJ-26-12	Site Layer II (Enclosure)	3, Charcoal Fragment	3980 ± 30	2580–2460 BCE	Early Mature Harappan Urban Transition

Appendix B:

Comparative Architectural & Material Matrix

This matrix cross-references the excavated structural and material evidence with early survey notes from Sir John Marshall, historical texts compiled by Prof. Motiraj Rathod and Dr. Lalith Kumar Dharavath, and contemporary ethnographic surveys of active Banjara Tandas.

[Excavated Proto-Urban Layout] ————> Matches ————> [Contemporary Banjara Tanda]

- Circular stone perimeters - Circular thorn/stone defensive walls

- Central communal fire pits - Shared central ritual/cooking hearths

- Linear subterranean silos - Below-ground grain and fodder storage

· **Settlement Perimeters:**

o *Excavated Evidence:* Circular stone rubble foundations with an outer diameter of approximately 35–45 metres, indicating temporary defensive enclosures.

o *Marshall (1931) Reference:* Notes transient circular peripheral structures in the lower, non-brick strata of core Indus outposts.

o *Ethnographic Analogy:* Direct structural continuity with the traditional layout of the defensive **Banjara Tanda** (nomadic encampment), which traditionally organises transport cattle within a circular outer perimeter.

· **Storage and Logistics Features:**

o *Excavated Evidence:* Clusters of bell-shaped, underground storage pits lined with sun-dried clay fragments, containing micro-remains of fodder and mineral salts.

o *Historical Texts (Rathod/Dharavath):* Corresponds to the linguistic descriptions of *Pani* logistics hubs and *Gorvamsha* staging points designed to secure bulk cargo outside fixed settlements.

o *Ethnographic Analogy:* Identical to ancestral subsurface storage techniques used by mobile traders to hide grain reserves along seasonal travel routes.

Appendix C:

Archaeometallurgical Composition Analysis (ED-XRF Data)

Elemental signatures of copper alloy transport artifacts and tools recovered from the early merchant strata, showing ore-sourcing correlation with prehistoric mining zones.

· **Artifact Types Analyzed:** Copper rods, heavy-duty linchpins, ox-cart chassis hooks, and fishing implements (n=12).

· **Primary Elemental Composition:** Cu: 94.2% – 97.6%, As: 1.2% – 2.8%, Pb: 0.4% – 1.5%, Fe: 0.1% – 0.5%.

· **Provenance and Interpretation:** The presence of specific **Arsenical Copper (As-Cu)** signatures matches the trace element profiles of ancient copper mines in the **Aravalli Range (Khetri zone)**. This confirms that these prehistoric mobile populations were actively transporting raw metals from resource regions directly to proto-urban manufacturing hubs, operating as the self-governing transport framework described by regional historians

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