# A Study on the Iron Artefacts from the Megalithic Sites of Dhamna Linga and Dhaulameti of Vidarbha

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***Abstract**: This paper attempts to understand the iron technology practised by the Vidarbhan Megalithic Community in general and at Dhamna Linga and Dhaulameti in particular. The probable Man – Land Relationship which has led to the development of the conceptual framework of geographical determinism in archaeology is also discussed.*

***Keywords***: Iron Artefacts, Iron Technology, Chemical Composition, Megalithic Sites, Dhamna Linga, Dhaulameti, Vidarbha

## Introduction

The concept of landscape studies has been used to understand the relationship between the monuments and landscape of the Vidarbhan Megalithic period by a few. Works by Sanders 1977, Carneiro 1970, Steward 1955 and Willey 1953 have shown that artificial transformation of a natural landscape is an indicator of societal formations within a society and according to Barrett (1999) the artificially altered landscape projects cultural values and customs. The Man-Land relationship in the form of a place for practising ritualistic and communal activities is advocated in the works of Alcock (1993) and Bradley (1993). It is interesting to note that the Early Iron Age sites of Vidarbha region are majorly located in the districts of Nagpur – Chandrapur – Wardha. The Early Iron Age sites are associated with the megalithic burials (sepulchral architecture) where along with the remains of the deceased, funerary offerings such as ceramics, metal assemblage (iron and copper) and animal remains (horse skeleton and cattle remain) were also interred. Although Black and Red Ware and Micaceous Red Ware ceramics surpassed any of the other assemblages, none the less iron tools made headway during this period – and a chunk of our cultural evolutionary phase, 'Early Iron Age' is attributed to the introduction and culmination of this specific metal technology.

## Reasons for the Development of Iron Technology in this region

The present study area falls within the Vidarbha region of Maharashtra and this is one of the regions which has abundant coal deposits, a major requirement for the iron

smelting industry and the richest coal deposit is at Telwasa (Chandrapur) and other minor deposits are at Nagpur and Yavatmal district. The coal deposit at Chandrapur is spread over 18 coalfields and the largest deposit Telwasa has about 320,000 million tonnes in reserve. It is important to note that economical iron ore deposits are found only in 3 districts (Chandrapur, Gadchiroli and Bhandara of Vidarbha and Ratnagiri in Konkan region) of Maharashtra (Table 1) and the most economic haematite deposit is located in Lohara (Chandrapur and Gadchiroli) and titaniferous magnetite (with vanadium inclusion) deposit is located in Bhandara district. *Lohara* deposit is marked by 81.22% of $Fe_2O_3$ (DID, 2006). The region of Vidarbha was suitable for the introduction and culmination of iron technology because it had easy accessibility to required natural resources (Iron, Coal) (Figure 1) and other minerals such as feldspar and mica (Figure 2).

Table 1: Description and Chemical Composition of Economical Iron Ore Deposits

| State | Deposits | Geological Formation | Chemical Composition (Haematite) % | Chemical Composition (Magnetite) % |
|---|---|---|---|---|
| Chattisgarh | Haematite | Pre-Cambrian | Fe: 65.80<br>$SiO_2$: 1.52<br>P: 0.047 | _ |
| Madhya Pradesh | Haematite | Pre-Cambrian | Fe: 46.43<br>Mn: 12.26<br>$SiO_2$: 12.09<br>$Al_2O_3$: 15.00<br>$P_2O_5$: 1.69 | _ |
| Maharashtra | Haematite Titaneferous Magnetite (Bhandara District) | Associated with the Archaean Schist | Fe: 63.75- 66.59<br>$Al_2O_3$: 0.84-2.83<br>$SiO_2$: 1.82- 6.10<br>P: 0.017- 0.076<br>S: 0.010- 0.032 | Fe: 54.66<br>$TiO_2$: 18.46<br>$V_2O_5$: 1.16 |

Earlier publications by Roy and Krishnan, 2018 and Roy, 2019 have dealt with the metallurgical technological aspects of the iron tools from the sites of Naikund, Khairwada, Mahurjhari, Borgaon and Bhagimohari. Based on the results derived from these sites, the iron assemblages from Dhaulameti and Dhamna Linga have been studied in this article. The socio – cultural connotations of each artefact type is based on archaeological data as well as ethnographic data.

## Study Area

The site of Dhamna Linga (Long. 78°51′E, Lat. 21°8.30′ N) (DMN) is located between the villages Peth and Dhamna in Nagpur District. The burials are located along the south east and south west bank of the Vena reservoir. Around 50 megalithic burials were first noticed on a horse-shoe shaped slope and were segregated into clusters. 12 burials were excavated for two seasons (2000 and 2001) by the Department of Ancient Indian

History Culture and Archaeology of R.T.M Nagpur University and each revealed unique architectural styles (Gupta and Kellellu, 2005). Three cairn circles (Meg 1, 8 and 10) have revealed apsidal peripheral burials beyond the boundary boulder (Kellellu et al. 2015).

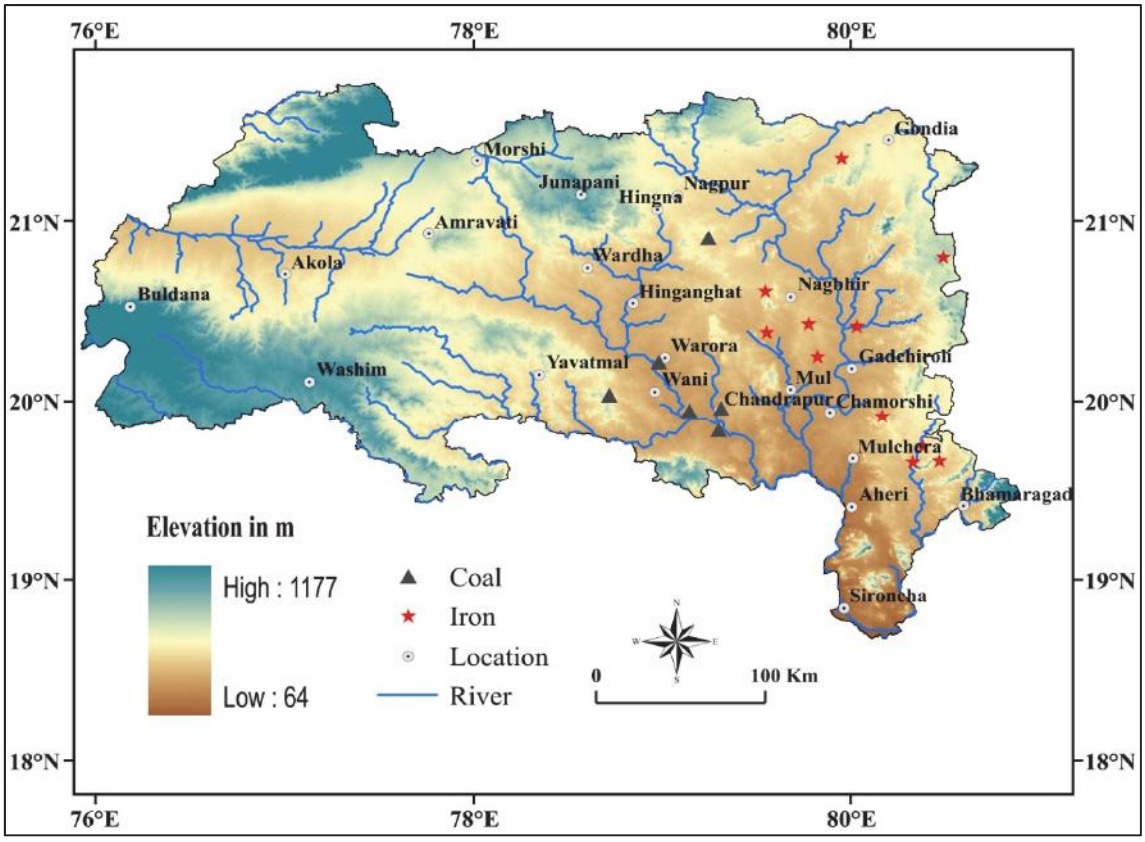


Figure 1: Map Showing the Important Iron Ore and Coal Deposits

The burials are of secondary nature however skeletal remains were arranged projecting proper anatomical knowledge (Kellellu et al. 2015). It is interesting to note that a sarcophagus as burial furniture was found from Dhamna Linga, which is rare in Vidarbha (Kellellu et al. 2015). Terracotta sarcophagus is a common Megalithic feature in southern India and the only two evidences from Vidarbha are that of an Oval boat-shaped sarcophagi with a covering lid used as a receptacle for the bones of a child from the site of Dhamna Linga (Figure 3) and a trough shaped red ware sarcophagus from Borgaon (I.A.R. 1980-81: 40). The intact red ware sarcophagus was found from the south-eastern periphery of Megalith 19, and it is the smallest known sarcophagus in the Indian context till date (Kellellu et Al. 2015). The central pit of Megalith 19 brought to light remains of a human primary burial along with a variety of iron objects such as ploughshare, axe with cross-fastener(Figures 12 and 12a), ladle and a copper bowl (Figure 4). The charred skeletal remains and the ash remnants also found from Megalith 19 still remain an enigma probably suggesting the practice of cremation pre-burial as seen in the ethnographic context of the Munda tribe of Purulia district, West Bengal (Personal exploration, 2013).

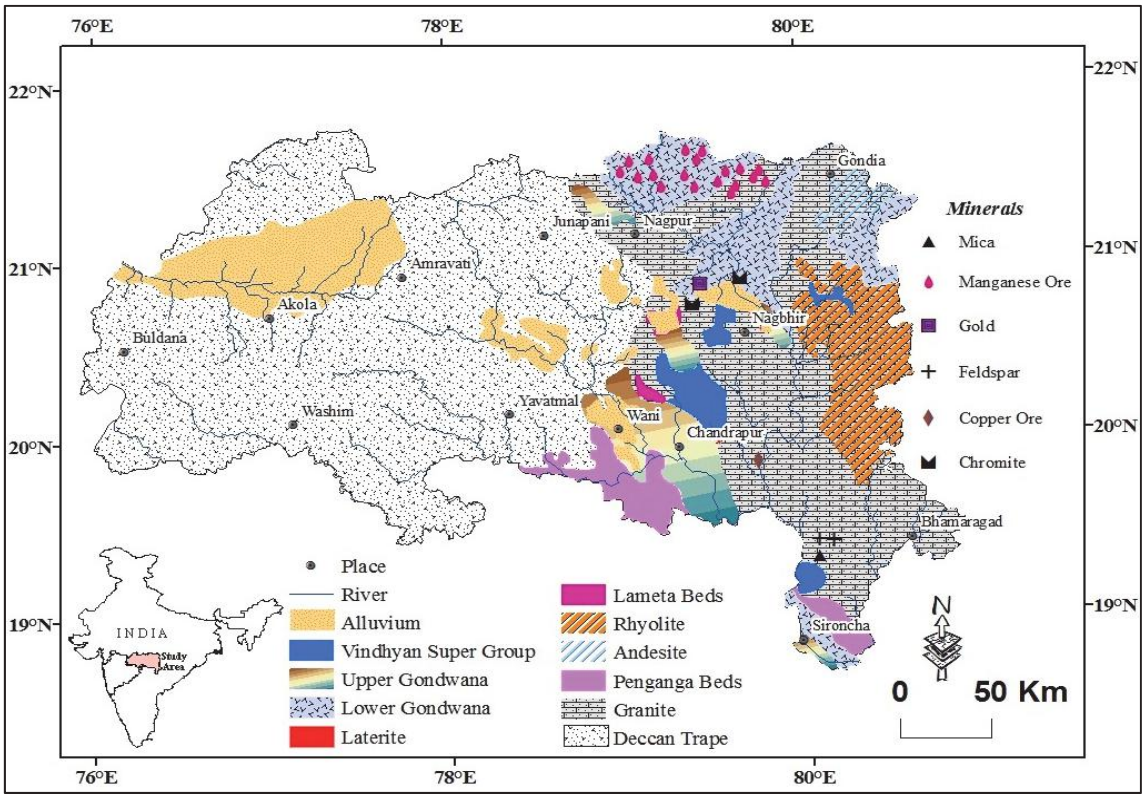


Figure 2: Map of Vidarbha Showing the Major Minerals Available


Figure 3: Terracotta Boat Shaped Sarcophagus from the Periphery of Megalith 19 (Courtesy: Department of A.I.H.C and Archaeology. R.T.M. Nagpur University)

Figure 4: Iron Lamp along with Pottery Sherds as Burial Offering
(Courtesy: Ismail Kellellu)

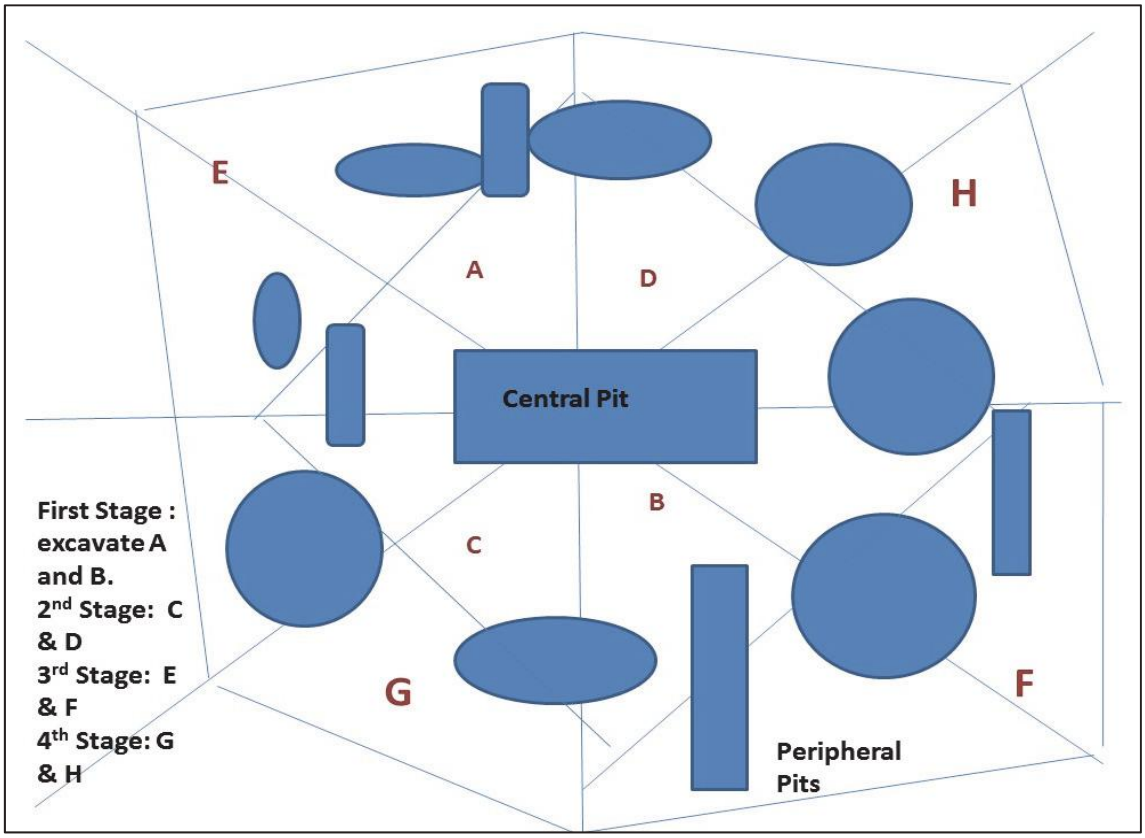


Figure 5: Schematic Drawing of the Octagonal Method Adopted
(Personal Communication: Ismail Kellellu)

Figure 6: The Excavated Cairn Circle at Dhavalameti Showing a Double Stone Circle (Courtesy: Ismail Kellellu)

Figure 7: Exposed Human Skeletal Remains (Courtesy: Ismail Kellellu)

The second site selected for this study is Dhavalameti (Long. 78°51'E, Lat. 21°9.55' N) (DMT). It is located within the restricted area of the Ambajhari Ordnance Factory of the Ministry of Defence. A small seasonal *nala* which is the tributary of River Venna, flows about 600 m north-west of the site. The site was reported in 1996 and excavated in 2004 by Department of A.I.H.C and Archaeology of R.T.M. Nagpur University.

Fourteen intact cairns and cairn circles were identified, however only one cairn circle was excavated using the newly developed Octagonal Method (Personal Communication: Ismail Kellellu, 2012) (Figure 5).

Interestingly, the filling material of the burials spreads beyond the boundary circle. The outer circle (18 m in dia.) was constructed using basalt boulders and which was further supported by rammed rubble, cobble and chipped stones. Within it, an inner circle, 4 m in diameter was constructed using rubble, which had been properly aligned (Figure 6). Two human burials were found outside the boundary of basalt boulders in the southeast and northwest quadrants (Figure 7) (Kellellu et al. 2015).

Table 2: Artefacts available from 2 megalithic sites

| Artefacts | Dhamna Linga (DMN) | Dhavalameti (DMT) | Total | Figure Number |
|---|---|---|---|---|
| Adze | 23 | 1 | 24 | 13 – 13c |
| Arrowhead | 1 | 0 | 1 | 9 |
| Axe | 6 | 2 | 8 | 12 – 12b |
| Borer | 0 | 1 | 1 | 18 |
| Chisel and Chisel Point | 2 | 1 | 3 | 16 – 16a |
| Dagger | 0 | 1 | 1 | 14 - 14a |
| Engraver | 0 | 1 | 1 | 17 |
| Knife | 1 | 3 | 4 | - |
| Ladle | 0 | 2 | 2 | - |
| Lamp | 7 | 0 | 7 | 11 |
| Nail Parer | 10 | 6 | 16 | 19 – 19a |
| Ring | 0 | 1 | 1 | - |
| Rivet | 0 | 1 | 1 | 15 |
| Rod | 0 | 1 | 1 | - |
| Spear/Spear Head | 2 | 0 | 2 | 10 |
| Unidentified Objects | 2 | 2 | 4 | - |
| Total | 54 | 23 | 77 | - |

## Artefact Assemblage

During the investigation at the repository of R.T.M. Nagpur University, 77 artefacts were recorded systematically by the first author. The artefacts were segregated based on typological variations and a statistical analysis was also done to understand the

distribution pattern of the artefacts. Table 2 and Figure 8 demonstrates the distribution of artefacts between the two sites and Dhavalameti has unveiled certain types of artefacts (borer, engraver and rivet) which have been rare finds in the context of Vidarbhan Megalithic sites. Dhamna Linga has reported the highest number of Adzes (23). Adze (Figures 13 – 13c) locally known as *rapi* is the most abundant artefact reported from the context of Vidarbhan Megalithic sites, and forms a major component of the megalithic iron tools reported from all the sites namely Vyhad (18), Naikund (3), Bhagimohari (36) (Roy and Krishnan, 2018) and Khairwada (7), Borgaon (11), Mahurjhari (93) (Roy, 2019), however Dhavalameti has yielded only one. Adze held an important position in the beliefs and customs of the society, however earlier scholars have limited its importance only to the local iron industry. These have been identified as ingots shaped as fanned blades and jointed into a rectangular blade and without any specific function (Park, 2012).

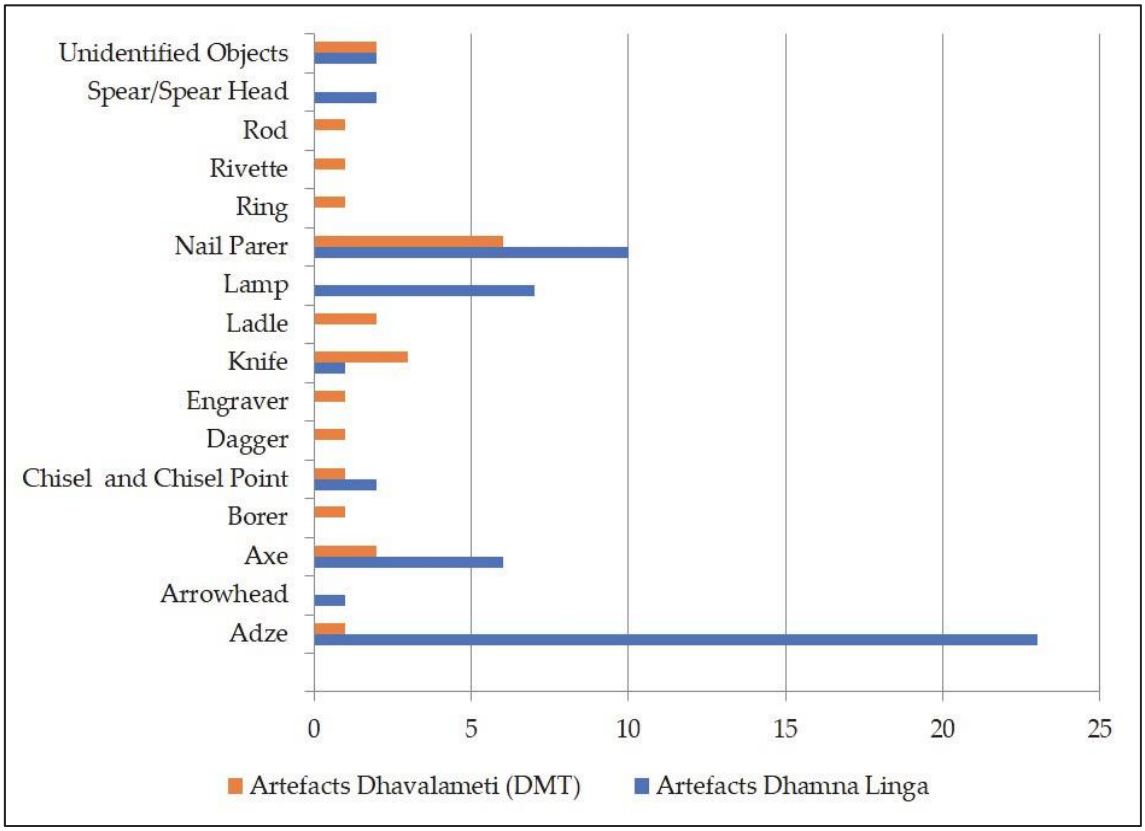


Figure 8: Iron Artefacts from Dhavalameti and Dhamna Linga

However microscopic investigations of these artefacts (Roy and Krishnan, 2018) and (Roy, 2019) have brought to light the application of steel making while producing this particular artefact. The micrographs of adze samples reflect hypo-eutectoid steel composition, where pearlite is embedded in pure ferrite. While recording the *Lohar* community of Vidarbha it has been observed that continuous process of forging, annealing and quenching is done to achieve this microstructure and it is mainly done to harden and strengthen the cross-section of the fanned ends so that during the

process of cutting using the fanned edge of the adze doesn't break. If the artefact would be used only for storing purpose, then there was no need to achieve this particular microstructure where the cutting edges were strengthened for particular heavy duty usage. Adze due to the presence of steeling technique applied on the blades, it has been identified as surgical tools used for minor surgeries for medical use. We do have ethnographic parallels from the tribal zones of Odisha and Telengana.

Figure 9: Arrowhead

Figure 10 Spear Head from Dhamna Linga

Figure 11: Lamp Stand from Dhamna Linga

Figure 12: Axe with cross-fasteners from Dhamna Linga

Figure 12a: Axe with cross-fasteners from Dhamna Linga


Figure 12b: Axe from Dhaulameti


Figure 13: Adze from Dhamna Linga


Figure 13a: Adze (Ritualistic Purpose) from Dhamna Linga


Figure 13b: Adze from Dhaulameti


Figure 13c: Adze from Dhaulameti

Figure 14: Dagger from Dhamna Linga

Figure 14a: Dagger from Dhamna Linga

Figure 15: Rivet from Dhamna Linga


Figure 16: Chisel from Dhaulameti

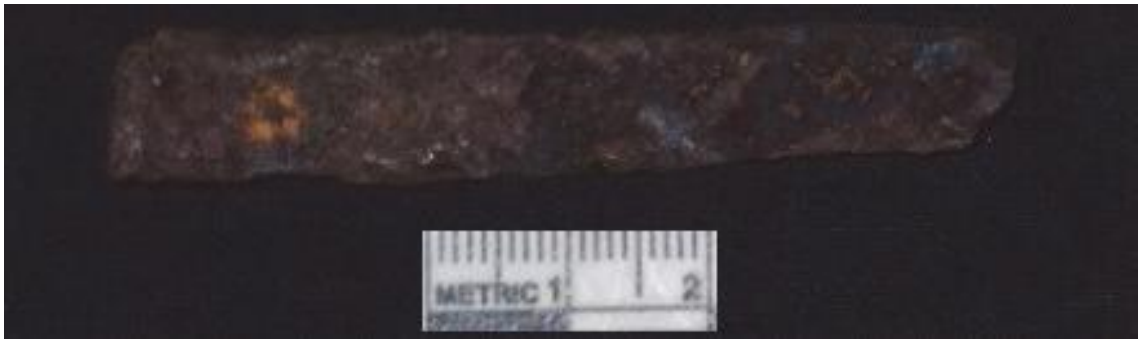


Figure 16a: Chisel from Dhaulameti


Figure 17: Engraver from Dhaulameti


Figure 18: Borer from Dhaulameti


Figure 19: Nail Parer from Dhaulameti


Figure 19a: Nail Parer from Dhaulameti

Nail parer (Figures 19 and 19a) (DMN: 10, DMT: 6) occupies the second position in order of abundance and has been found from all the sites. They have been found in accordance with adzes. Although we do not have any tool still in use comparable to adze, however we do have ethnographic analogies from a tribal society in Andhra Pradesh. During the 1950s and 1960s inhabitants of a remote village in Kurnool district used a similar tool for surgical purposes i.e. to perform minor surgeries (*Personal Communication, Ismail Kellellu 2012*). We do have ethnographic evidence of a tool similar to a nail parer and it is still used for a similar purpose in villages in Odisha (*Personal Communication Rabi Mohanty 2016*). The triangulated blade at one end of the tool suggests a surgical usage. In Odisha this tool is used by barbers to cut nails and the pointed end is used for removing ear wax. Probably in the archaeological context they had a similar purpose and the pointed end was used for trepanation purpose. It is important to note that they were found from both habitation and burial context, however 80% of the assemblage has been found from the burial context. The third object (Axe) (Figures 12 – 12b) stand in third position. 6 axes have been reported from Dhamna Linga. The visual examination of the tools suggests that the megalithic assemblage consists of tools having a wide range of utilitarian purpose such as wood work (chisel and chisel point, borer, engraver and rivet), hunting (arrowhead, spearhead), agricultural activity (axe), multi-purpose (dagger, knife, ring, rod) and household activities (Table 2).

## Statistical Analysis of Artefactual Assemblage

Morphometric data of the artefacts was processed to understand the relationship between the parameters. It was done using the R-software. Artefacts were chosen keeping in mind that all the artefacts were under prolonged use and the dimensions recorded are the post-excavation available dimensions. Secondly only those artefacts have been considered which are intact. This analysis was important as the relationship between parameters would aid in establishing the concept of standardization of artefact manufacturing.

It is important to note that every artefact has undergone post-depositional damages, and artefacts measuring between 48 mm – 55 mm have all been grouped under the category of miniature adzes. All the miniature adzes were found from the burial context. The artefact from Dhamna Linga measuring 145.9 mm is unusually large to be brandished as a tool for surgical purpose. In Figure 20, we can see that there are no outliers in the length of the adze. The red line shows the mean (average of the length of all the artefacts) and black bold line shows the median (middle point) of the parameter

length of the Adze. The Y-axis shows the length of the Adze. The box-pot shows no outliers suggesting all the adzes follow the same trend. The scatter plot (Figure 21), shows how the scattered tendency of length of the Adzes. The red line shows the mean and green line shows the median of length of the Adze. The Y-axis shows the length of the Adze and X-axis shows the breadth of the artefacts and the scatter plot shows a weakly negative correlation which suggests that with the increase in length breadth of the artefact will decrease, however the change will not be distinctive. This proves the megalithic smithers conformed to the standard, shape, size and weight as no major change is seen in the dimensions of the artefact adze. The presence of standardized artefacts from the entire Early Iron Age Megalithic zone of Vidarbha suggests a strong role played by a centralized administrative unit.

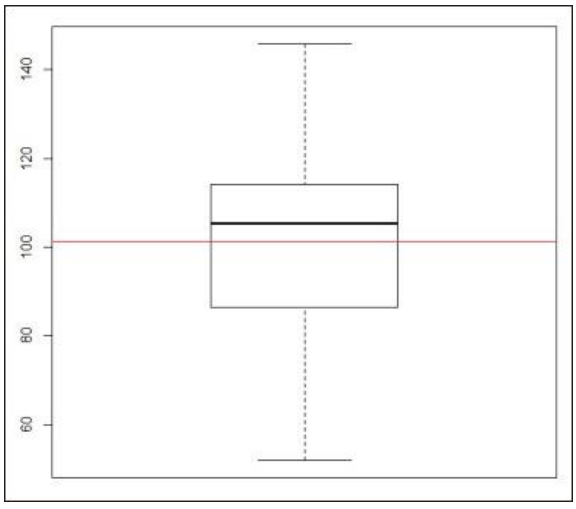


Figure 20: Box Plot for Adze Assemblage Showing no Outliers

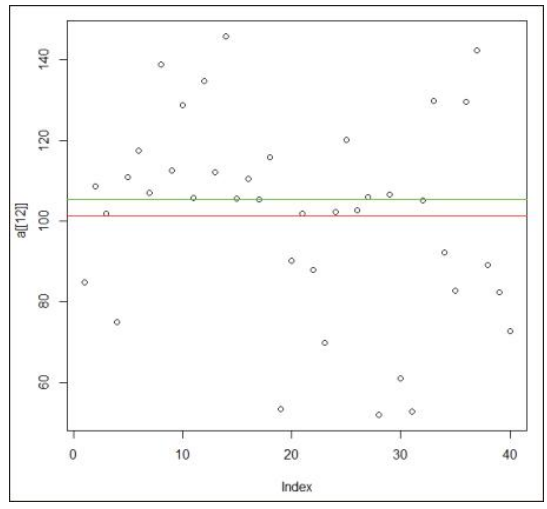


Figure 21: Scatter Plot Showing the Clustering of Artefacts

## Socio – Cultural Construct of the Vidarbhan Megalithic Society Based on the Tool Assemblage

The artefact assemblage suggests that the society was segregated into groups based on labour specialization. The cluster of multi-purpose tools such as knives and axes were used by all sects of the society. However, tools like hoes, sickle and digging tools were specifically used for cultivation purposes. The availability of such tools proves the importance of agriculture/ food production and the necessity of tools specifically made for tilling soil or cutting food grains. Therefore, the practice of food grains production/ cultivation forms a specialized labour. The non-availability of such tools from the sites of Dhamna Linga and Dhaulameti probably suggests that the farming community was not present, and the agricultural products were procured from other nearby settlements suggesting the existence of barter/ exchange system. However, it should be also kept in mind that only 2.5% of the entire site was brought under excavation so the representation of the tool assemblage should not be assumed as total representation of the total assemblage. The axe as a tool has been categorized under multi-purpose tool however according to Rao (1988) axe was used only for domestic purpose and was

never used as offensive weapons. It is a cutting tool. It comprises a head and a handle. All the axes found from the megalithic sites are double bevelled. The head consists of a broad cutting edge and the handle is the hafting end (Figures 12 – 12b). Ethnographic survey has brought to light the use of the axe for only clearance purposes.

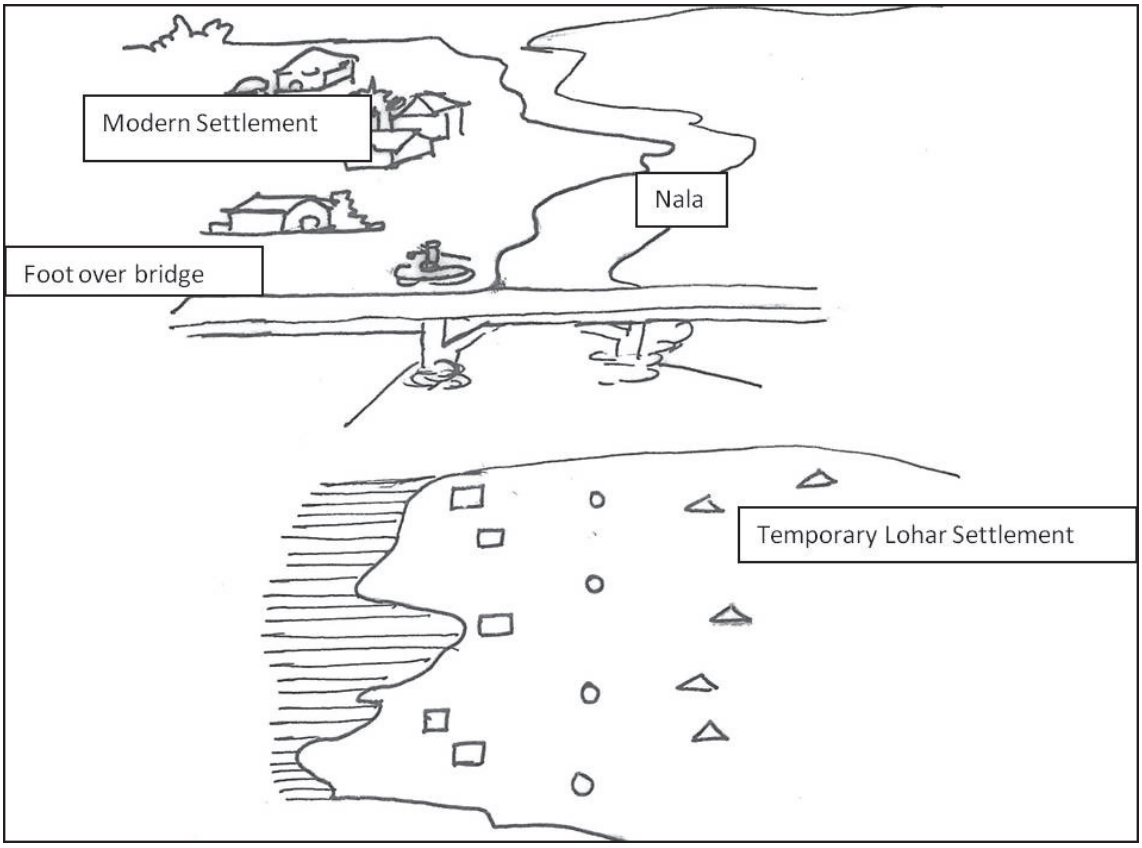


Figure 22: Layout of a Seasonal Lohar Camp

Figure 23: Temporary Settlement of Lohars

Table 3: Chemical Composition of Anhydrous Haematite of Lohara Deposit (Analysed by Mr David Forbes) (Hughes, 1873)

| Element | Amount (%) |
|---|---|
| Iron (Fe) | 69.2 |
| Oxygen (O) | 29.4 |
| Manganese sesquioxide ($Mn_2O_3$) | 0.1 |
| Silica (Si) | 0.8 |
| Alumina (Al) | 0.4 |
| Lime (CaO) | 0.05 |
| Magnesia (Mg) | Trace |
| Sulphur (S) | 0.01 |
| Phosphorous (P) | 0.005 |

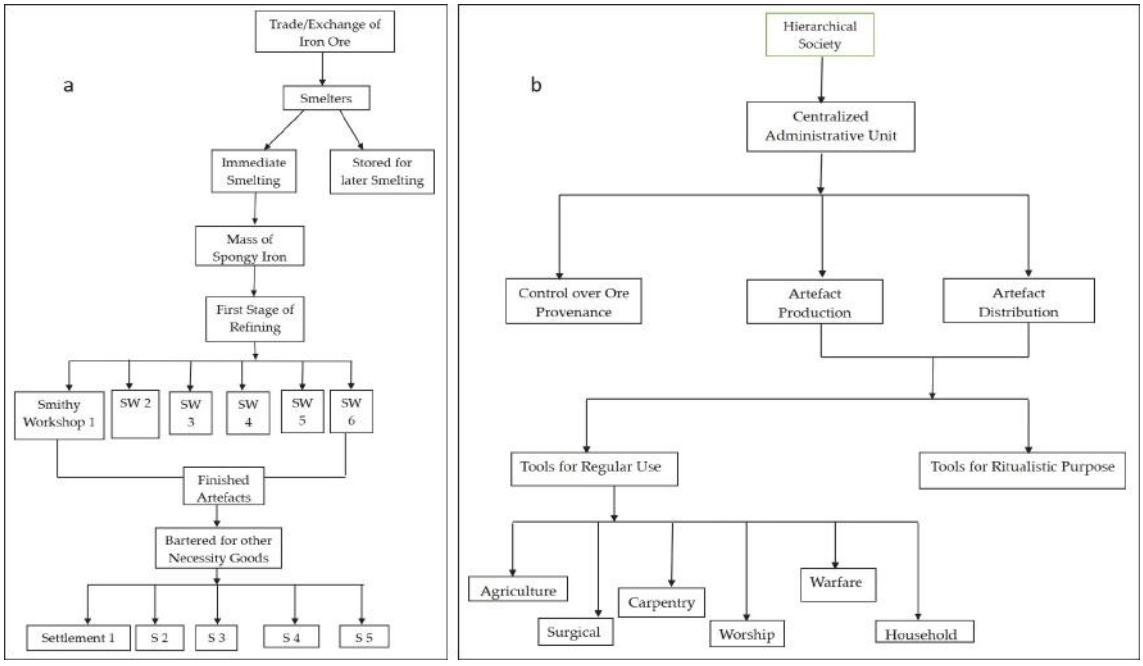


Figure 24: (a) Flowchart Showing the Probable Structure of the Iron Tool Producing Community and (b) flowchart Showing the Probable Societal hierarchy present in the Megalithic Early Iron Age Society

Similarly, tools such as drill points, borers, engravers, chisels, chisel points and rivets suggest that there was also a group of artisans specializing in carpentry. Borer is a pointed tool which was probably used for drilling or enlarging an already existing hole. This was probably a component of the carpenter's tool set (Figures 17 and 18). This implement can be grouped under workmen's tools along with chisel and chisel point, engravers and rivets. Chisel (Figures 16 – 16a) and Chisel point is a long handled tool used for shaping metal objects, aids in wood carving and used for leather working. It has a long blade with a rectangular cutting edge and the other end is a tang. The tanged end is used for hafting into a wooden handle. The other tool grouped under carpentry is a rivet which is a lasting mechanical clasp. The main purpose is to join two

metal sheets or one metal sheet with a wooden plank. It consists of a cylindrical shaft with one head. After inserting the cylindrical shaft into the drilled hole, the other end is flattened by beating it which makes another head (Figure 15). This renders strength to the clasp. Very few specimens have been unearthed from the megalithic level. The wide range of tools associated with wood work undoubtedly suggests that carpentry formed a significant labour specialization. Arrowhead (Figure 9) is used as a projectile tool. Earlier scholars like Banerjee (1927) describe arrowhead as a weapon of war and he describes them as '*ayomukham*' or '*ayoagraya*' which is interpreted as an implement tipped with *aya* or iron, to make it strong and sharp. However arrowhead could be also used for hunting as reflected in ethnographic records and especially arrow points (Figure 9) is still used by Bada Maria Gonds of Gadchiroli for hunting small games. Similarly we have tools representing warfare or tools specifically used for defensive or offensive purpose such as spear head. This object is grouped under the defensive category. It has a long blade of about 20 cm and the width of the blade ranges between 2.5 - 4.5 cm. The working edge is a point formed by two converging sides of the blade (Figure 10). The hafting end forms a tang which is inserted in the bamboo shaft, and the composite tool is used as a projectile tool. Only 9 specimens have been recovered from the megalithic level. Maximum number (4) has been recovered from Vyhad, However none was reported from Naikund, Khairwada, Dhaulameti and Mahurjhari (Roy and Krishnan, 2018 and Roy, 2019). This indicates there was a group of people specializing in warfare. Groups of people specializing in different activities have been clearly projected in the artefactual assemblage and there was a mutual co-existence (Figure 24b).

The standardized artefacts (Figures 20-21) (shape, size and typology) also suggests that there was a centralized administrative unit which directed the iron-smiths to make a certain type of products, using a certain type of smelted iron, utilizing a certain type of technique and there existed an exchange network where finished tools exchanged for raw materials or other necessary commodities. Then the acquired finished tools were supplied to different settlements which were located within the same geological zone but were not near enough to be frequently covered by foot (Figure 24a). It can be rightly said that the society reflected here is a non-surplus economy, and similar to the present day nomadic '*lohar*' community, the megalithic community, also engaged in a barter system. The nomadic *Lohars* camps are generally identified by temporary shelters constructed using colourful cloths or plastic sheets (Figures 22 and 23). They travel in bullock carts which are loaded with their basic amenities like utensils and livestock. They prefer to set up their temporary camps near perennial water sources so as to facilitate constant water supply for their livestock. They follow the traditional mode of barter trade. The present rate of exchange is as follows. The *Lohars* sharpen and repair agricultural tools in exchange for food grains, however for making new tools they barter with livestock. For example, one hoe for two chickens, one axe and one hoe for one goat and so forth. The concept of money in exchange of goods is still not so prevalent. However when they sell goods at the nearby weekly market they do so in lieu of money, as they have to purchase scrap iron for their smithy purpose.

In fact, a nexus of exchange was prevalent within the selected megalithic settlements, located within present day Vidarbha, as proved by the similarity in the morphology of the tools, composition and the metallurgical techniques found from all the megalithic sites.

The manifestation of ferrous artefacts in the cultural assemblage of a site indicates towards the existence of indigenous iron smelting and smithy techniques. Indigenous development of a technology advocates the easy availability of raw materials (ore, fuel etc.) and the access to the technology of smithery. Vidarbha as a provided all the elements (ore, fuel and refractory clay) required for a culture to invent, innovate and develop the iron technology according to Theodore W.H. Hughes (G.S.I., 1873) indigenous or 'native' furnaces for iron smelting used by the *Maharattas* in Chanda Central province were recorded. Present day Chandrapur was known as Chanda during the British regime. According to the report, the native iron smelters preferred utilizing the anhydrous haematite (Table 3) deposit because of its high ferric content (69.2%). Lohara deposit has the highest ferric content in this region and similar deposits were also available at Dewalgaon and Gunjwahi. The native furnaces recorded were found at Chikli, Gulab-bhuj, Metegaon from Muhl tehsil and also from Armori, Dewalgaon, Injhewara located in Bhrahmapuri tehsil. In the same record we get a vivid description of the furnaces used by the *Maharattas* and also a clear description of the first stage of refining done by the smelters themselves and then the bloom (*chul*) were bartered with the iron smiths (*Lohars*). This brings us to the conclusion that the geological zone was inherently suitable for the development of iron technology and the natural resources were suitably and economically utilised by the inhabitants to their advantage. Therefore White's theory culture is an extra somatic means of adaption (1959) is clearly visible in this zone.

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