ANCIENT ASIA

Vol. 16, 2025, pp. 227-249

URL: https://ancient-asia-journal.com
https://doi.org/10.47509/AA.2025.v16i.13

Landscape and Settlement Pattern of Southern Neolithic Sites in the Eastern Raichur Doab

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Abstract: *Raichur Doab is geographically a confluence region of Krishna and Tungabhadra rivers, covering Raichur district of Karnataka and Kurnool district of Andhra Pradesh and Jogulamba Gadwal district in Telangana. Neolithic sites in Eastern Raichur Doab fall under the Southern Neolithic (3200-1200 BCE) group with its general characteristic being sedentary villages with rich ground and edge stone tool assemblages, ceramic assemblages, animal and plant remains and the most unique is the ashmound and rock art sites. This paper highlights the landscape and settlement pattern of Neolithic sites in the Eastern part of Raichur Doab, where the Neolithic villages seem associated with the granitic hills with dyke resources, perhaps also bearing substantial natural springs. As the region is geomorphologically conditioned to two broad non-perennial channels (Krishna and Tungabhadra, the landscape must have been prospective to groundwater aquifers, and dykes in the hills barrier to rise springs. This paper also reviews the nature and locational pattern of Neolithic sites in the Eastern part of Raichur Doab analysed with the use of geospatial tools like Google Earth, Base Camp and ArcGIS.*

Published : 22 November 2025

TO CITE THIS ARTICLE:

Srijja Merugu, Arjun R., Deepak Pal & Elanthendral S. R. (2025). Landscape and Settlement Pattern of Southern Neolithic Sites in the Eastern Raichur Doab. *Ancient Asia,* 16: 1, pp. 227-249. *https://doi.org/10.47509/AA.2025.v16i01.13*

1. Introduction

Neolithic culture played a crucial role in establishing sedentary society and advanced the pastoral and agriculture-based subsistence economy. During the Pleistocene period, humans did not try to bring a remarkable change in their way of life towards food production, but in the post glacial period, the subsistence adaptability to the revived nature must have improved their way of life, by advancing towards the crop cultivation along with animal domestication and manufacturing of much more sophisticated polished and grinding tools. This fundamental change was revolutionary development in

humankind (Childe 1936). Childe (1936) called the Neolithic culture as a first revolution that brought considerable and remarkable changes in the economy and handed control over the food supply for the self. The Neolithic culture of the Indian sub-continent is regional in cultural characteristics and temporality, which can be classified into northwestern part of India along with Kashmir and Swat valleys; Vindhyan Plateau including the Belan valley; Kaimur ranges and the Chota Nagpur plateau; Mid-eastern region, covering the Saran district of Bihar; North eastern region of Assam (Assam complex), covering Assam and adjacent sub-Himalayan regions; Central eastern region including Bihar, Bengal and Orissa complex and also covering Chotanagpur region with its plains extending to West Bengal and Orissa; Southern region covering peninsular India (see Arjun 2024: 64) .

The Southern Neolithic region is unique to its ashmound and rock art tradition with sites emerging in the southern and central Deccan Plateau during 3200-1200 BCE (Korisettar et al. 2002; Arjun 2017a, 2017b, 2018a, 2018b, 2022a, 2024). Southern Neolithic sites found spread across all the major non-perennial river basins such as the Kaveri, Bhima, Tungabhadra and Krishna in Karnataka, Tamil Nadu, Telangana and Andhra Pradesh. Major excavated sites here include but not limited to Utnur (Alchin 1961), Nagarjunakonda (IAR 1957-58), Veerapuram (Sastry et al. 1984), etc. in Andhra Pradesh; Tekkalakota (Nagaraja Rao 1964; Malhotra 1965), Piklihal (Alchin 1960, also see Arjun and Pal 2023-2024), Maski ((Yazdani 1936-37; Thapar 1957), T. Narasipura (Seshadri 1968-69), Sanganakallu (Subbarao 1948), Kupgal (Majumdar and Rajguru 1966), Hallur (Nagaraja Rao 1971), Brahmagiri (Wheeler 1948, also see Arjun 2017c, 2018a, 2018b, 2019, 2022b) in Karnataka; and Paiyampalli (IAR 1967-68) in Tamil Nadu. See Korisettar et al. 2002 and Arjun 2017a for a comprehensive gazetteer of explored/ documented southern Neolithic sites.

Utnur (Allchin 1961) and Veerapuram (Sastry et al. 1984) are the two excavated sites in the study area. Veerapuram, a village located in Nandikotkur taluk of Kurnool district is a multiperiod site from where, evidences related to Neolithic, Megalithic and Early Historic periods were reported. The site was excavated in three seasons from 1978 to 1980 by BACRI (Birla Archaeological and Cultural Research Institute) revealing the settlement continuity from 1800 BCE to 400 CE. Period I is identified with Early Neolithic (1a); Late Neolithic(1b); Chalcolithic(1c). Period II is identified with Megalithic and Period III is identified with Early Historic Culture. Utnur is a multi-period site belonging to Neolithic and Early Historic cultures. It is a neolithic ashmound site as well as an Early Historic habitation site. The site reported ceramic wares such as Buff and Black ware, Grey ware, Buff brown ware etc from Neolithic level and Black and Red ware, Red ware etc from Early Historic levels. The other implements reported from ashmound accumulations includes blades of chert, jasper, flakes, lunates, etc. The surface collections included discs, rubbers, grinders, hammers etc. mostly made of basalt and dolerite etc. Infant burial, fragments of animal bones of *Bos indicus* etc were reported from the site.

The South Indian Neolithic tool technology is characterized by pecked and ground stone industry, bone tool industry, blade and microlith industry, copper and bronze tools in comparatively scarce numbers. The stone tools used by them are of both edge tools like polished axes, adzes, chisels, scrapers and non-edge tools like rubbers, grinders, querns, pestles etc. Microliths were made using chalcedony, chert and quartz. Low elevated valleys of the Dyke swarms served as major sources to gather dolerite blocks to settlements and for stone tool workshops (Arjun 2024).

The pottery used by the people in the early Neolithic culture phase were found to be handmade except at Maski, where wheel thrown pottery were reported. The primary purpose of the ceramic production is for cooking and storing. Lower Neolithic culture witnessed the production of Grey ware, Black ware, ochre painted with incised decorated varieties, whereas dominated ceramic wares during

Upper Neolithic period include Black ware, Red ware of slip varieties, Burnished ware without slip, Rusticated ware (Arjun 2024). Black-and-Red ware was used by upper Neolithic people, and further continued in Iron age societies.

The subsistence pattern of the people revolved around animal husbandry supplemented by farming or it was an agro-pastoral economy. Southern Neolithic region, which is part of central and southern Deccan mainly falls under the rain shadowed region. It is embraced with non-perennial rivers and rivulets. Summer crops cultivated such as the millets included fox tail millets, black gram, horse gram etc which were perhaps frequently consumed (Fuller and Korisettar 2004; Sneha and Arjun 2024) and other crops like wheat, barley, rice were also cultivated which were of wet crop types.

Ashmounds are mounds of burnt cow dung, burnt at high temperature, in an episodical manner, resulting in formation of vitrified lumps and deposition of ashy material. In accordance with their geographical spread, they were restricted to the districts like Kalaburagi, Raichur, Bellary, Bijapur and Belgaum of Karnataka along with Mahbubnagar, Kurnool, Anantapur of south western Andhra Pradesh (see Zeuner 1959; Allchin 1963, Paddayya, 2019). In the layers of ashmounds, cultural materials were traced including ceramics, stone tools and faunal remains (Arjun 2017a, 2021, 2024a). Some of the major ashmounds spread across North eastern Karnataka and south western Andhra Pradesh are Utnur, Budihal, Palavoy, Kupgal, Kudatini etc. Evidence of Ashmounds suggests that contemporary society then, was dominated by agricultural and pastoral economy.

The art works of south Indian first food producers survived in various forms like paintings and decorations on pottery to terracotta figurines of birds, animals and men to rock-carvings, bruising and paintings in rock shelters. Rock art can be identified around the hill settlements, like in Billamarayanagudda, Maladkal, Watgal and rock art over dyke swarms, where no settlement evidences are found like in Advibhavi-Rampura (Arjun 2017b, 2018a, 2018b, 2022a). Images of fauna, anthropomorphic etc are usually found.

The Neolithic people of the South Indian region generally lived on the top of granite hills or hillocks, where they used natural rock shelters and spaces covered by granite boulders for their dwellings. They also resided on the slopes and plains near the hills. The ornaments found in this region include beads made from steatite, terracotta, amethyst, greenstone, carnelian, argillite, chalcedony, agate and also bone.

Southern Neolithic settlements focused on the natural resources of the regional geographies for their essential needs, for example the hilly and terrain landscapes, and valleys. The natural springs on hilltops must have caught the attention of Neolithic communities, and such types of settlements can be observed in Granitic Gneiss formations of Dharwar Craton. Raichur Doab is one part of the northern parts of the Dharwar Craton with the abandoned formation of dyke swarms and granodiorite inselbergs (Arjun 2024). The southern Neolithic sites can be classified on their locations as riverine sites, open air sites, hillock sites (foothill/ hilltop) and further in terms of their occupational pattern into habitation sites, rock art sites ashmound sites and workshop sites (Arjun 2024).

Neolithic culture in Andhra Pradesh (undivided) gained prominence and attention from the excavations of Nagarjunakonda, Utnur and Palavoy. Numerous Neolithic sites in Kurnool, Anantapur, Kadapa, Nellore etc were discovered by Rami Reddy, indicating the presence of early farming communities in Andhra Pradesh. Life and culture, settlement pattern, ecology, economy, tool technology of Neolithic sites dated to c. 2400 BCE till 900 BCE were prominently studied (See Rami Reddy 1985). The north western part of Kurnool district covering Adoni and Kurnool talukas and southern part of Gadwal taluk in Mahbubnagar district on the banks of river Tungabhadra were studied by Venkatasubbaiah (2021). Both open air and foothill sites were occupied by the Neolithic

people with a possibility of exchange and network-based settlements and existence. Ashmound and habitation sites like Kambadahal served the purpose of cultural congregation (Venkatasubbaiah 2021). Venkatasubbaiah (2021) highlights the importance of available land for practicing agriculture, animal domestication, accessibility of raw material etc. Presence of unfinished artefacts makes it possible to draw a conclusion that raw material was transported from resource base to settlement area for making objects (Venkatasubbaiah 2021). Neolithic people occupied the streams in comparision with main rivers. On the basis of study of Neolithic sites scattered in Eastern part of Doab, it indicates that, they might belong to early and middle phases of Neolithic culture.

Neolithic sites across Kunderu river basin (Nandyal valley) around north of Cuddapah and south of Kurnool districts in Andhra Pradesh belong to the third phase of southern Neolithic, i.e. Late Neolithic phase. The Neolithic sites from the core Ashmound regions who began crop cultivation as early as *c.* 2200 BCE and Mesolithic culture of the Kunderu region were contemporary. They might have had trade exchanges as well, as they are neighbouring regions (Fuller et al. 2000-2001).

2. Study Area: - Eastern Part of Raichur Doab

The Raichur Doab is a geographical region between the confluence of river Krishna and Tungabhadra, which has shown potential to study the settlement pattern of Neolithic and Iron Age Cultures (Arjun 2017, 2021). As administrative boundaries are concerned, Raichur Doab covers Raichur, Kurnool and Gadwal districts of Karnataka, Andhra Pradesh and Telangana states respectively. On the basis of the physiography, Raichur Doab is categorized into Western and Eastern parts (Mukherjee et al. 1934, 1936). Western Raichur Doab is mostly rugged terrain with a range of Gneissic valleys, granodiorite inselbergs, dyke swarms spread across the districts of Raichur, Bellary of Karnataka. The eastern part of Raichur Doab is relatively plain in Kurnool district of Andhra Pradesh. Raichur Doab has dry deciduous forests with tree shrubs, grasslands, very scanty vegetation, sometimes barren on the stony waste or low land denudational (Arjun 2017a, 2021) with semi-arid climate and dry conditions. North western part of Kurnool district constitutes Adoni, Kurnool talukas and southern part of Gadwal taluka of Mahbubnagar district in Telangana falling in the catchments of lower Tungabhadra basin, which is part of Eastern Raichur Doab. Geographically, this region falls under the northern extremity of Mysore plateau with black, brown and red soils (Venkatasubbaiah 2021). Red soil is found in the foot hill regions between hills and hillocks of granites. Archaeans and Dharwars consisting quartz, granite, gneiss, dolerite, schists, etc. are primary geological formations of the region with many seasonal streams that drains into the river Tungabhadra which supports the growth of thick shrub vegetation along their banks and supplied with rich fauna. Sites like Tsallakudluru, Manopadu, Mantralayam, Daivamdinne, H Maruvani, Penchikalapadu, Kambadahal etc fall under this lower Tungabhadra region. Adoni and Alur talukas of Kurnool district falls in the Krishna Tungabhadra Doab with an incredibly low density of trees/ scrubs with few granitic outcrops. Geological formations under Eastern Raichur Doab can be classified into Kurnool series of sedimentary, panneum quartzites, owk shales, Narjee limestones, Banaganapalle Group (Mukherjee 1936). Raichur Doab, so far identified with the middle Palaeolithic (Korisettar 1979, Varaprasada Rao et al. 1992), Neolithic (Foote 1916) Iron Age and Early Historic sites (Allchin 1954).

3. Objectives and Methods

The Shorapur Doab and Raichur Doab are two geographical regions formed by the confluence of rivers Bhīma-Krishna and Krishna-Tungabhadra. A considerable number of sites are found from the region through geological as well as archaeological research by Meadows Taylor, Robert Buce

Foote, Leonard Munn, A. Sundara, Raymond Allchin, K. Paddayya, Ravi Korisettar and recently by R Arjun (See Paddayya 2019). There is tremendous scope for regional landscapes and ecological studies leading to settlement/ occupational expansions occurring within the region from one cultural period to another with recurrent reoccupation of sites indicating consistency in the land use strategies and resource management (Arjun 2024).

The aim of this research is to understand the landscape of the Eastern Raichur Doab and examine the settlement pattern of southern Neolithic culture (3200-1200 BCE) through reported primary sites. Further to compare the settlement pattern of the southern Neolithic sites of Western Raichur Doab and test the hypothesis whether there are any modest effects on the site distribution pattern based on resources prominence dynamics. To achieve these objectives, the site data were primarily collected from the excavation and exploration reports, mapped the sites on ArcGIS and Google Earth Pro. and we further analysed the geo-locations of the sites ranging from the riverine plains to rugged granitic tors and contextualize the possible distribution of pastoral and agricultural economies sustained during the southern Neolithic culture. Except for Maladkal and Utnur, site geo-coordinates mapped on the thematic maps were based on the locations of modern hamlets/ villages further aided with toposheets. We have studied a total of twenty-two sites from the eastern part of Raichur Doab in this paper (Table 1, Figure 1).

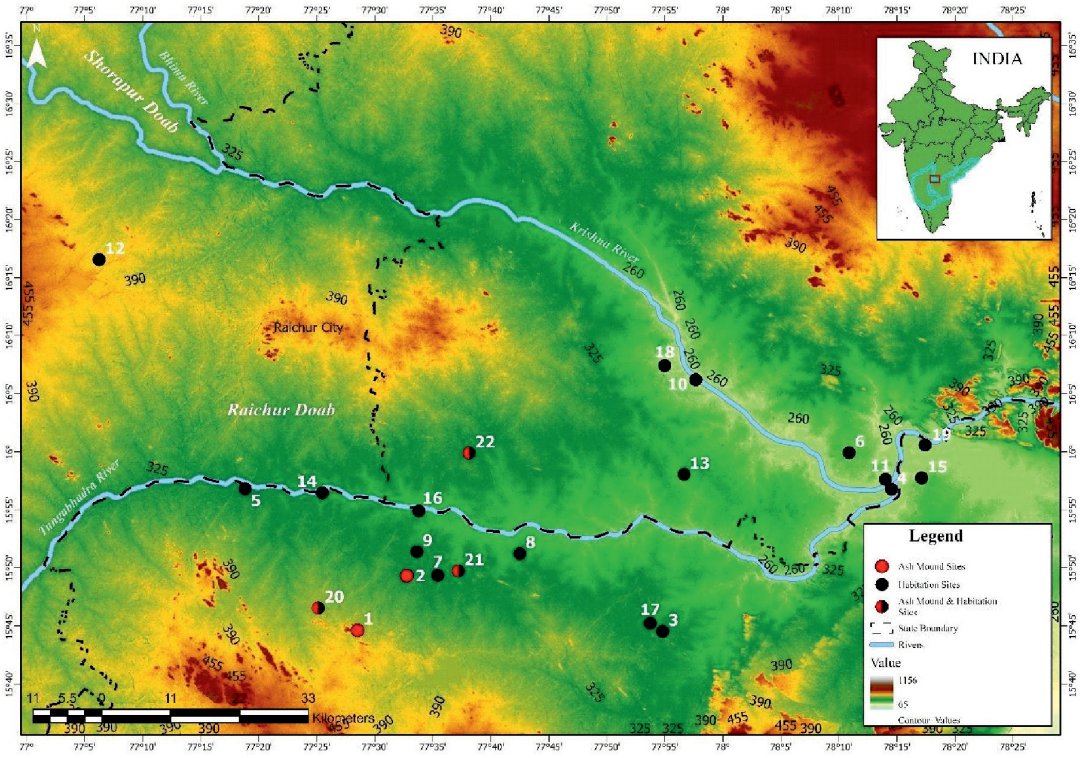

Fig. 1: Neolithic sites studied in the Eastern part of Raichur Doab. See Table 1 for site list.

Table 1: List of sites studied from eastern Raichur Doab.

Sl. No	*Name of the site*	*Nature of the Site*	*References*
1.	Gudikallu (15°44'35'' N, 77°28' E)	Ashmound	Rami Reddy, 1978
2.	Tsallakudluru (15°49'05"N; 77°32'E)	Ashmound	Venkatasubbaiah, 2011
3.	Budidapadu (15°44'31"N; 77°54'47"E)	Habitation	IAR 1962-63
4.	Chagaturu (15°56'45"N; 78°14'30"E)	Habitation	IAR 1977-78

Sl. No	*Name of the site*	*Nature of the Site*	*References*
5.	Chetnepalli (15°56'47'' N, 77°18' 50'' E)	Habitation	Rami Reddy, 1978
6.	Chinnamaruru (15°59'54"N; 78°10'52"E)	Habitation	IAR 1978-79
7.	Daivamdinne (15°49'N; 77°35'25"E)	Habitation	Venkatasubbaiah, 2011
8.	Inagandla (15°51'30"N;77°47'25"E)	Habitation	Venkatasubbaiah, 2011
9.	Kanakavidupeta (15°51'45"N; 77°34′E)	Habitation	Venkatasubbaiah, 2011
10.	Karpakula (16°6'11"N; 77°57'38"E)	Habitation	IAR 1976-77
11.	Kudavelli (15°57'36"N; 78°13'59"E)	Habitation	IAR 1976-77
12.	Maladkal (16°16'33.6''N, 77°06' E)	Habitation and Rock art	Arjun, 2017a, 2021
13.	Manopadu (15°58'N;77°56'30"E)	Habitation	Venkatasubbaiah, 2011
14.	Mantralayam (15˚57′N;77˚25′55"E)	Habitation	Venkatasubbaiah, 2011
15.	Muravakonda (15°57'43'' N, 78°17' E)	Habitation	IAR 1980-81
16.	Nagaladinne (15°54'53'' N, 77°33'48'' E)	Habitation	Rami Reddy, 1978
17.	Penchikalapadu (15°45'05"N;77°53'45"E)	Habitation	Venkatasubbaiah, 2011
18.	Shaikpally (16°7'25"N; 77°55'1"E)	Habitation	IAR 1976-77
19.	Veerapuram (16°0'33''N, 78°17''25'E)	Habitation	Sastry et al. 1984
20.	H Maruvani (15˚46′N;77˚25′20" E)	Ashmound and Habitation	Venkatasubbaiah, 2011
21.	Kambadahal (15°49'40"N; 77°37'30"E)	Ashmound and Habitation	Venkatasubbaiah, 2011
22.	Utnoor/ Uttanur (15°59'52'' N, 77°38' E)	Ashmound and Habitation	Allchin 1961

4. Landscape and Settlement pattern of Neolithic Sites in Eastern Raichur Doab

In this research we studied a total of Twenty-two Neolithic sites, they are as follows;

4.1. Budidapadu

Budidapadu, located on the tributary stream joining river Tungabhadra, located in Kurnool district, which is reported with Neolithic assemblages. IK Sarma conducted explorations in the region in the year 1962.The site reported Neolithic implements like celts, chisels etc. along with microliths (IAR 1962-63:2).

4.2. Chagaturu

Chagatur is located close to the confluence region of Krishna and Tungabhadra rivers and objects made of Shale, stone, terracotta were found. Structures made of shale stone blocks were built over the already existing structures. Chagaturu is also multi-period site with structures constructed using shale stone blocks, red polished, black and red wares, figurines of male and female and beads of terracotta, beads made out of shell, stone; stone made discs or spindle whorls; gold and silver ornaments; ivory stylus or antimony rod are reported from period I. Lower palaeolithic tools were reported below the occupational layer of Period – I.

Conical bowls and spouts of sprinklers of Dull-red and red wares along with beads and bangles made out of shell, terracotta and iron objects like sickle, nail, etc were reported from Period – II (IAR 1977-78:11). The strata of Period III are very much disturbed and the antiquities like bangle pieces made using glass; objects made from Iron; beads of glass; and a coin issued by Humayun Shah Bahamani belonging to medieval times were reported.

4.3. Chetnepalli

Chetnepalli with its location on the bank of river Tungabhadra is a multiperiod site from where evidences related to both Neolithic and Megalithic culture were reported. It is located about 48 kms north east of Adoni. The Neolithic site is found at two localities of the village. One is located one kilometre north east of the village and the other one is 1.5 kilometre north west of the village. The

former locality reported more cultural materials than the latter one. Both the sites together reported 320 artefacts belonging to the blade industry including one hammer stone, 6 flakes and one Neolith and 25 Megalithic potsherds (Rami Reddy 1978).

4.4. Chinnamarur

The Neolithic-chalcolithic habitation site of Chinnamarur is located on the left bank of river Krishna in Mahbubnagar district. The excavation exposed two phases of occupation. The lowest phase is of the neolithic culture and upper being of Chalcolithic culture (IAR 1978-79; 64-65). Pale-grey ware, painted with simple designs were reported from Neolithic phase whereas chalcolithic culture reported grey, burnished grey and black wares with glossy surface along with spouted vessels, few post-holes, large hearth, and a tool made of stag-horn

4.5. Daivamdinne

Daivamdinne is located on the left bank of a rivulet of Peddavanka stream joining Tungabhadra. The mound is spread over 0.56 hectare. This open-air site falls under Lower Tungabhadra region. The site consists of a mound with a height of 1.25 m (Venkatasubbaiah; 2021). The site is currently under cultivation, with rich cultural material like pottery, stone tools and objects of pecked and ground stone tools, animal bones, etc were scattered over the surface.

4.6. Inagandla

Inagandla (Enagandla) located at the foot of granite hillock covering an area of 0.40 hectares located 3.5 km from the right bank of river Tungabhadra. A notable feature of the site is that a dolerite dyke runs in east-west direction for about 15 m north of it and the site is reported with dolerite cores, blades, and polished stone axes.

4.7. Gudikallu

The Neolithic site is over a granite hill, located south of the village, 23 kms north east of Adoni and three kms south of Yemmiganur. There is a huge Ashmound known, which is locally called as Narriavulagattu. One could observe scattered iron ore and slag pieces over the surface of the mound (Rami Reddy ; 1978)

4.8. H Maruvani

H Maruvani is a habitational as well as an Ashmound site, located on a hillock which is of 1.5 m above the surrounding elevation. A Granite hillock in this village and 8 km far of area from Yemmiganur town was explored by Venkatasubbaiah (2021), where he observed an exposed section with 0.5m thickness with Neolithic artefacts like pottery, stone flakes, animal bones on the slope and terrace of the hillock. Evidences related to the habitational activity belonging to the Neolithic period were scattered over an area of 0.12 hectare at the foot of hill, with scattered dolerite polished axes, pottery, animal bones, stone objects and stone other tools.

4.9. Kambadahal

Kambadahal site is spread over 0.14 hectares with an ashmound and open-air settlement, located 150 m east of Peddavanka stream. The ashmound with a habitational deposit surrounding the mound exposed pottery, stone objects and animal bones. The mound is of an elevation of 2 m. with thick vitrified ash layer on its top and below it there are series of soft ash layers due to periodic burning of

cow-dung. The dimensions of the mound include 40 m. east-west, 35 m. north-south of a height of 1.5 m. (0.14H) currently (Venkatasubbaiah 2021). The uppermost vitrified ash layer reported lots of dolerite raw material, rubber stones, hammer stones. It was probably because villagers might have lifted and thrown it on the surface while digging the soft ash. There is a Habitation deposit of 30 and 10 meters wide on the eastern, southern and western side of the mound with reported artefacts like pottery, stone objects and animal bones but very few in quantity

4.10. Kanakavidupeta

Kanakavidupeta is an open-air Neolithic habitation site covering an area of 0.8 hectares. The 2m elevated mound reported dolerite polished axes, pottery, animal bones, stone objects and other stone tools. The site is currently used for cultivation, and one could find dolerite dykes as its field boundaries. The material remains of Neolithic period reported are polished axes, pottery, animal bones, stone objects and other tools which are scattered in the plough zone sediment. There is another Neolithic habitation site on the other bank of the same rivulet, showing potsherds, stone objects, dolerite tools, animal bones.

4.11. Karpakula

Karpakula, with its location on the bank of river Krishna is a multiperiod site, where cultural assemblage of both Neolithic and Early Historic periods were reported. Explorations conducted in the submersible area of Srisailam Project in Kurnool and Mahbubnagar districts by Shri I. K. Sarma, assisted by Dr T.V.G. Sastry, Sarvashri B. Raja Rao and Y. Krishna Rao, of the South-eastern Circle. Among the various sites which were explored, Karpakula, a site belonging to Alampur taluk of Mahbubnagar district reported evidence related to Neolithic culture and early historic culture (IAR 1976-77;8). However, the report does not detail the kind of artefacts found.

4.12. Kudavelli

Kudavelli, is a multi-period site just like Karpakula, located on the bank of river Krishna. Evidence related to Middle Palaeolithic, Mesolithic, Neolithic and Early historic cultures were found at the site. I. K. Sarma, assisted by Dr T.V.G. Sastry, Sarvashri B. Raja Rao and Y. Krishna Rao, of the South-eastern Circle conducted explorations in the submersible area under Srisailam Project in Kurnool and Mahbubnagar districts. Reported artefacts belonged to the Middle Palaeolithic Age, Mesolithic culture, Neolithic Culture, Megalithic culture and early Historic culture (IAR 1976-77;8).

4.13. Manopadu

Manopadu with its location at the bank of Peddavagu stream is a Neolithic habitation site spread over 0.56 hectares reported dolerite blocks and flakes, nodules of chert etc. A low-lying mound of 1.5 m elevation in the village Manopadu is reported with Neolithic evidences like pottery, dolerite blocks and flakes, Pecked and ground stone objects and artifacts like mullers, sling-balls, querns, rubber stones along with nodules of chert and animal bones (Venkatasubbaiah ; 2021).

4.14. Mantralayam

Mantralayam site is a habitation site reported just 500m away from river Tungabhadra spreading over an area of 0.35 hectares. Mantralayam is a pilgrimage centre located northwest of Yemmiganur town in Kurnool district. A Neolithic habitation site measuring 50 m north-south and 70 m. (0.35H) east-west with a thickness of about 0.5m located at a distance of 2 km. southeast of village Mantralayam

(Venkatasubbaiah PC; 2021). Reported evidence include dolerite polished stone axes, broken axes, and potsherds belonging to grey, and red ware along with rubber stones, hammer stones and animal bones in huge numbers.

4.15. Muravakonda

It is a village in Kurnool district in between the villages Kudavelli and Veerapuram. The Neolithic site was located at an elevation of 10 m from the present bed near Muravkonda village (IAR 1980-81;3). The habitational deposit varying from thickness 0.50 to 0.75 m is lying on the yellowish sub-recent silt and reported polished axes, querns, mullers, rubber-stones, along with few potsherds and animal bones. An Acheulian site with both finished and unfinished tools along with flakes, cores, chips on eroded limestone was traced in Muravkonda at about 0.30 to 0.50 km away from the high-level gravels. The site might be used for both occupational and industrial purposes and raw material used might be quartzite.

4.16. Nagaladinne

Robert Bruce Foote explored the site Nagaladinne, a village with its location on the right bank of the river Tungabhadra which is about 46 kms north east of Adoni town. Robert Bruce Foote (1914;85) collected microliths and later Subbarao (1949; 93-4) also collected several artefacts belonging to the blade industry. Recent explorations reported artefacts from three localities. Locality - I, which is three fourth of a km east of village, locality - II is about one km east of village, lying between two streams and locality – III is few metres to the west of the village. Three localities of the sites collectively reported 180 artefacts belonging to blade industry, among them 74 are finished and rest are unfinished, seven pot sherds of grey and dull red ware are collected, including 13 sherds belonging to the Megalithic period.

4.17. Penchikalapadu

Penchikalapadu, a habitation site on the bank of Peddavagu stream, an affluent of Handri river, is spread over 0.8 hectares. The village is 19.5 km. south-east of Kurnool town which is at the junction of Kurnool-Bellary and Kurnool-Yemmiganur road. A Neolithic habitation lies 2 km south-east of the village. It is a low-lying mound with an elevation of 20-30 cm. height from the surrounding fields. The habitation is spread over an area of 0.8 H and measures 100 m. north-south and 80 m. east-west. The site reported cultural material like animal bones, pottery, pecked and ground stone tools and objects, charcoal bits, etc (Venkatasubbaiah; 2021).

4.18. Shaikpally

Shaikpalli located on the bank of a stream joining at river Krishna, reported with Neolithic period and microlithic assemblages. Shri I. K. Sarma, assisted by Dr T.V.G. Sastry, Sarvashri B. Raja Rao and Y. Krishna Rao, of the South-eastern Circle of the Survey after conducting exploration in the site Shaikpally which is in Alampur taluk of Mahbubnagar district collected artefacts belonging to Neolithic culture (IAR 1976-77;8).

4.19. Tsallakudluru

The Neolithic habitation mound is in a village called Tsallakudluru, which is located 9.5 km. north-east of Yemmiganur town. The Neolithic habitation mound is of an elevation 2.5 m to the surrounding fields (Venkatasubbaiah ; 2021). Currently, it is spread over 0.8 H which measures 80 m. north-south,

100 m. east-west and with a thickness of 2 m. Reported cultural material include pottery, stone objects, stone tools, animal bones etc. The mound initially was in circular form, but currently, its western portion is having a longitudinal cut with a depth of 1.5 m. resulting in leaving a section facing west. The surface of the mound towards east is disturbed. The southern part of the mound is brought under cultivation leaving the height of the mound 1.5m. Soft ash lumps have been exposed in the north western part of the mound along the field boundary, which indicates the presence of Ashmound, but as of now it is completely vanished. Along the 2 m thick section of the mound, only lumps of vitrified ash are seen (Venkatasubbaiah, 2011).

4.20. Utnur

Utnur (Uttanuru) is in Mahbubnagar district of Telangana state, which is located closer to river Tungabhadra. It is in the centre of a small outlier of Dharwar rocks comprising hornblende schists overlapped by Pegmatoidgneiss blanketed by soil. There are granite outcrops, near to the village around Alur region. One could find south of the mound the fine and loamy soil in orange or reddish-brown colour, whereas around the mound and towards north of the stream is sandy and beyond the stream is black cotton soil. The site was excavated by the Department of Archaeology of Andhra Pradesh in 1957-1958 under the direction of Raymond Allchin (Figure 2). The aim of the excavation was to investigate the age of the ash accumulation and to investigate Robert Bruce Foote's (1916) hypothesis, that "the mounds were composed of burnt cow-dung, accidentally fired, and that they represent some sort of connection with the Neolithic people of the Deccan and to understand the nature of the ash accumulation.

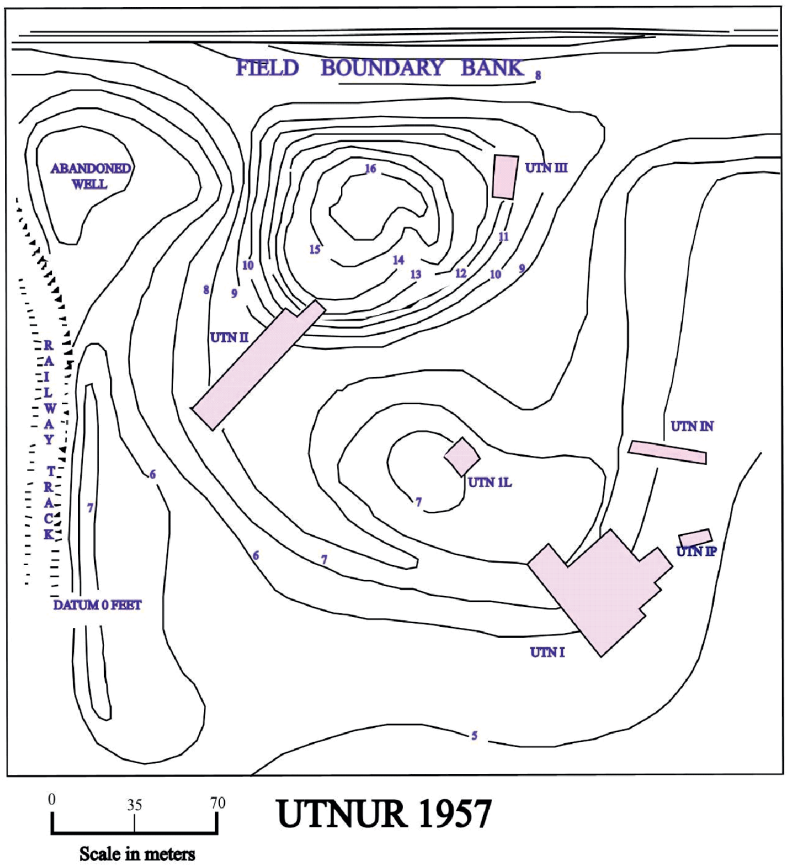

Figure 2: Utnur ashmound and excavation locations, after Allchin 1958.

The excavations revealed the cultural assemblages of the Neolithic and Early Historic periods (Table 2 and Figure 2). The Neolithic assemblages reflect the nature of an ash mound site. Ceramics of Neolithic are majorly made of coarse clay with some admixture of grit particles. It is highly possible that the clay was coming from the stream near the site. The rest of the ceramics are made of much finer clay, which shows the possibility of importing clay from another place. Approximately 90 percent of the Neolithic sherds are grey, black, and buff wares, and they are hand-made without burnishing. The excavation did not produce a good number of Early Historic assemblages; only a few potsherds of black and red ware are found associated with the fragments of white-painted russet-coated ware. Along with these findings, the excavation also unearthed an infant skeleton remains and several animal bones mainly of cattle (Bos indicus), but a few are of deer and goat. And layer 2 of UTN-I produced a fragment of the perforated tablet which could be from the early historic period. Thick deposition over a well rammed floor indicated the initiate process in the ashmound formations. Deposits were found further mixed with discarded potsherds, charred animal bones, along with that the blades of chert and chalcedony were reported in the inner stockade from the occupational deposit. A series of irregular deposits of ash indicates the large accumulation of cow dung on a seasonal basis. Several layers of burnt material indicate that the site has undergone many configurations. C14 dating of charcoal deposits from period 1B from the ashmound gave a date of 4120±150 BP. The excavation was carried out in three localities: UTN I, UTN II, and UTN III. Later, the UTN I is further extended to three smaller trenches identified as UTN 1 P, N, and L (Table 2).

Table 2: Ashmound stratigraphic sequences and findings from Utnur (Allchin 1961)

Layer No.	*Strata Sequence*	*UTN I*	*UTN IP*	*UTN IN*	*UTN IL*	*UTN II*		*UTN III*	*Findings*	*Cultural Sequence*
1	Humus and Powdered ash	✓	✓	✓	✓	✓			Black, Red, Black and red ware sherds.	Early Historic to Early Medieval
1A	Loose deposits of rock fragments and soil							✓		
2	Mixture of Ash & Soil	✓	✓	✓	✓	✓			Black, Red, Black and red ware sherds. Ash wall (thickest deposit of vitrified ash), fragments of the shoulder of red polished ware sprinkler. Fragments of bones and a fragment of deer's horn. UTN II produced the burrows filled with the black and red ware sherd and small animal bones.	Iron Age, Early Historic and Early Medieval.
2A	Highly vitrified ash							✓	The total depth of ash was 2ft 6 inch.	
3	Compact clay soil	✓		✓		✓		✓	Cattle hoof impressions, in situ pockets of residual ash. A few numbers of Black, Red, Black and red ware.	Iron Age, Early Historic and Early Medieval.
3A	Brown clay with burnt surface					✓				
4	In situ thin deposit of ash	✓				✓		✓		

Layer No.	*Strata Sequence*	*UTN I*	*UTN IP*	*UTN IN*	*UTN IL*	*UTN II*		*UTN III*	*Findings*	*Cultural Sequence*
5	Fine compact grey-brown soil mixed with small white flecks	✓	✓	✓		✓		✓	Small number of Neolithic wares, fragments of worked stone, chert and basalt and other occupation debris and fragments of cattle bones. Burrows are found in UTN II.	Neolithic.
6	Soft friable white, grey and cream coloured ash	✓		✓	✓	✓		✓	Small number of Grey, black and buff ware	Neolithic.
7	Thin compact soil with yellow speckling	✓				✓		✓	Cattle hoof impressions, a unique and curious finding, is the negative impression of a shaft of wood of triangular section and about 4ft in length. This shaft had evidently been deeply pressed into the surface, when it was soft. Neolithic Grey, black and buff ware, fragments of charcoal and animal bones	Neolithic.
8	Ash deposit ranges dark grey to brown	✓	✓	✓	✓	✓		✓	This layer produced considerable number of fragments of Neolithic pottery with the remains of stone and bones	Neolithic
8A	Thick compact layer of light mottled soil	✓							A good quantity of cultural debris, Grey, black and buff ware sherds, fragments of worked stone and bones of cattle, sheep and goat.	Neolithic
9	Thin layer of light brown soil	✓		✓		✓			Skeletal remains of an infant. The skull was completely crushed, only the ribs and one humerus survived unbroken. The absence of teeth inferred that the child was newly born.	
10	Ash deposit	✓								
11	Light loamy soil with burnt surface and traces of cattle hoof impression	✓	✓	✓	✓					
11A	Red sticky soil	✓								
12	Highly compacted greenish-grey soil	✓		✓	✓				Clear impression of cattle hoofs.	

4.21. Veerapuram

The site Veerapuram is situated in the valley region of the river Krishna in Nandikotjur taluka of Kurnool district. The mound with scattered relics is extended at an area of 9.5 acres. It is a multiperiod site including Neolithic, Megalithic and Early Historic periods. The site was excavated in three seasons

from 1978 to 1980 by Birla Archaeological and Cultural Institute. The mound found its place on the edge of a peneplain formed at the junction of Erramalai and Nallamalai hills at the Eastern Ghats. Kurnool district is rich in Kurnool rock system predominantly calcareous with shales and limestones. Excavations established a stratigraphy of three cultural phases spanning from Neolithic, Megalithic and Early history, Period - I Neolithic (IA Early Neolithic, IB Late Neolithic, IB Chalcolithic), Period II Megalithic and Period III Early History. Early Neolithic pits of wide base and narrow top containing blade tools made of cryptocrystalline silica, rubber stones made of quartzite, along with fireplaces, ashes, and some potteries were found. Coarse and red ware, burnished ware, coarse grey ware, burnished grey ware, burnished buff ware and burnished black ware with no paintings are the reported ceramic wares. Scrapers, backed blades, parallel sided blades of stone blade industry along with flakes, chips, fluted cores were found. Steatite disc beads along with animal bones were also found. In the late Neolithic, circular house plans with rammed floors were found. Buff ware, slipped and burnished red ware, black and buff ware, black and red ware and painted wares were used by the people and simultaneously continued ceramics of previous traditions. Burials of both urn as well as extended type are found during this phase. The number of steatite beads was increased. Additionally, Bone tools like points, borers, were introduced during this phase. Beads and bull figurines made of terracotta and two knobs of lids made in the form of bull heads made of terracotta are found. In the Chalcolithic phase copper was found and it was the last phase of Neolithic with the continuity in usage of painted pottery. Scrapers, awls, burins, backed blades, blades with retouched or used marks, lunates, flakes, cores and chips of blade industry were reported. Disc shaped steatite beads, soapstone beads, Faience beads, terracotta bulls and an object resembling a miniature thin double- edged axe with an hourglass section are significant findings. People continued to follow the similar burial practices of the late Neolithic period. Oval shaped and circular house plans including fireplaces with charcoal and ash remains were observed during this phase with a good number of stone axes, querns, spheroids, sling stones. Neolithic culture developed and spanned from 1800 to 1000 BCE, Period II Megalithic Iron Age and Period III Early Historic cultural phase spanning from Satavahanas to Late Maharathi period (c. 400CE). Two major cuttings on the central and western mounds revealed the settlement continuity from 1800 BCE to 400 CE. The excavators identified a sterile layer, i.e. absence of cultural activities from 1000-500 CE.

4.22. Maladkal

Mukherjee et al. (1936:82) reported Maladkal village bearing rock art on the hilly boulders. Maladkal is a Neolithic-Iron Age site. Maladkal is situated at the hilltop and foothill of a granodiorite inselberg of Maladkal village in Devadurga taluk, Raichur District of Karnataka. Located 24 km south of river Krishna and 35 km north of Tungabhadra. On archaeological grounds, the easternmost extent of Neolithic Iron Age sites of the western part of Raichur Doab can be considered by this site. The broader catchment area extending up to the river Krishna in the north and dyke valleys in the southwest is suggested by the evidence at the site like dolerite celts and Microlithic industry of low-density knapped out of river pebbles of chert and chalcedony.

Collections of several lithic artefacts at the foothill have been reported by initial researchers (Mukherjee et al., 1936:82). The recent and the most detailed work on this site was conducted in 2017 by R. Arjun (2017a, 2021). Important findings were made, including the identification of additional sub-terraces with evidence of rock bruising, pictographs along with features like ringing rocks, artificially created water holes, and grinding grooves. These features are increasingly found in the summits and mid-slopes of the inselberg (Figure 3).

In total, 23 localities of rock bruising are identified, and one pictograph is found associated with eight ringing rocks, three clusters of water holes, and three clusters of groove marks (Table 3). The figures of cattle and anthropomorphs mainly dominate the contents of the bruisings, and figures of deer, elephant, peacock, and buffalo are also evident. The only pictograph locality at the very lower terrace of the inselberg contains a red pictograph depicting one of the important representations of a plant (Arjun 2017a, 2021), which could be the leaf of Deccan cycad (*Cycas circinalis*) or a pinnate palm leaf (Figure 4). Themes of hunting, dancing, or walking in postures and gestures are common, and an interesting scene is presented where five human being motifs are bruised; they seem to be engaged in attacking the cattle, and one among them is seen holding the horns of the cattle in a fierce manner.

The habitational location is overlooked by the aforesaid features of the inselberg, with evidence occurring from the buried ashmound of 16 hectares at the southwestern foothill of the inselberg. Micro blades of chert and chalcedony, long parallel-sided blade of chert and chalcedony cores, dolerite axes and sling balls, along with ceramics of wheel turned grey buff-brown of Neolithic types, red slipped and black-and-red ware of Iron Age types are included in the evidences here. Based on these prominent indicators, it is determined that the site is of Mesolithic, Neolithic, and Iron Age settlement.

Figure 3: A) General view of the granodiorite inselberg of Maladkal from the west with Neolithic habitation at the foothill,

Table 3: Mapping the rock bruisings and associated archaeological features from Maladkal. Shaded box indicates presence of different features in each locale scattered within the site/ hill. After Arjun 2017a: Table 3.52.

Label no.	*Rock bruisings*	*Ringing rocks*	*Water pools*	*Axe grinding grooves*	*Grinding grooves*
M1					
M2					
M3					
M4					
M5					
M6					
M7					

Label no.	*Rock bruisings*	*Ringing rocks*	*Water pools*	*Axe grinding grooves*	*Grinding grooves*
M8					
M9					
M10					
M11					
M12					
M13					
M14					
M15					
M16					
M17					
M18					
M19					
M20					
M21					
M22					
M23					

Figure 4: Pictograph of plant species in red, from the rock shelter of Maladkal. The plant may be of a leaf of Deccan cycad (Cycas circinalis) or a pinnate palm leaf. (Arjun 2017a).

Discussion and Conclusion

The Neolithic sites in the study area can be clustered into two major concentrations, one in the confluence region of the rivers Tungabhadra and Krishna, and the other one is further west, distant from the confluence on either bank of Tungabhadra and Krishna. In total, there are twenty-two Neolithic sites studied in the Eastern Raichur Doab, of which 14 sites belong to the Tungabhadra cluster and seven sites are in the confluence region and on the banks of Krishna, and one site, Maladkal, is situated in the distant west, relatively demarking the Raichur Doab into the western and eastern parts. The observations and inferences are drawn concerning the nature of the site, its landscape, geology, and material evidence reported. The nature of the Neolithic sites in Raichur Doab can be characterized into three categories: a) ashmound sites, b) habitation sites, and c) both ashmound cum habitation sites. The middle category constitutes the majority with 17 sites, the latter with three sites, and the former with the least of two sites. The habitation sites are unanimously found in both the concentrated areas, but the ashmound and ashmound-habitation sites are found only in the Tungabhadra concentration. The two major concentrations/clusters each have one excavated site, namely, the Utnur (ashmound-cum-habitation site) in the Tungabhadra cluster and the site of Veerapuram (habitation site) on the confluence cluster. These excavations contribute significantly to understanding the region's excavated context and drawing relative inferences for the other sites. In the ratio of the nature of the sites suggests that the Neolithic population settled along the fertile alluvial plains of the eastern part of Raichur Doab, probably practicing agriculture with the sourcing of water from the main river (in case of riverine sites) or the seasonal flash currents (in case of inland sites). And the existence of ashmound sites further inland from the habitation sites suggests the preference in Pastoralism/Pastoralists.

From the lenses of geology, 11 sites are situated on the Younger Granitic Gneisses Group, six sites on the Kurnool Group, four on the Peninsular Gneissic Complex-II, and one on the Gadwal Group (Figure 5). The average altitude for the riverine sites is 260m, the inland sites are 325m, and the hilltop sites range between 350 and 390m. The Maladkal (12) site is considered in the study area to display the aforementioned demarcation and give an approximate backdrop regarding the Neolithic sites of Western Raichur Doab. On archaeological grounds, the easternmost extent of Neolithic-Iron Age sites of the Western Raichur Doab can be considered by this site. The western Raichur Doab is distinct in aspects of geology and geomorphology with features like series of low altitude sudden granitic outcrops along dyke swarms, where the Neolithic sites are mostly found along the inselbergs (either in foothill or summit) or around the dyke formations (Figure 6). The eastern part of the doab can be generally characterized as plains of fluvial deposits brought by the rivers Krishna and Tungabhadra, with patches of granite exposures and few denudational outcrops in the middle of the doab and further south. Here, the Neolithic sites are mainly associated with these low-lying granite exposures, dyke swarms and the floodplains surrounding them. This may be the reason for the non-availability of any types of rock art here in the eastern doab, because it lacks suitable/ preferential localities of hill outcrops/ inselbergs, as we see in the case of the western Raichur Doab. Another distinction is that evidence of pre-Neolithic cultures and the continuity is much more rooted in the western Raichur Doab and the Bhima Basin (Shorapur Doab). In contrast, the occupational history must have become robust since the Neolithic period.

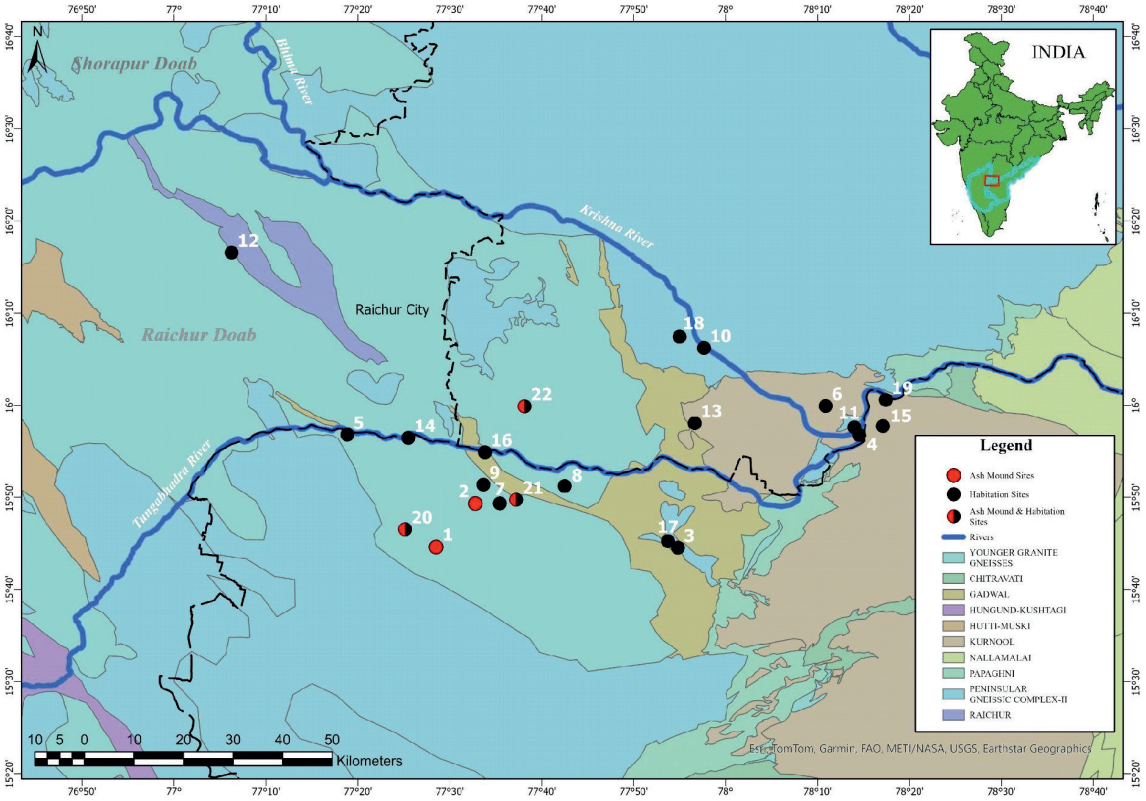

Figure 5: Neolithic site distribution in the geological subgroups in the Krishna-Tungabhadra confluence area. See Table 1 for site list.

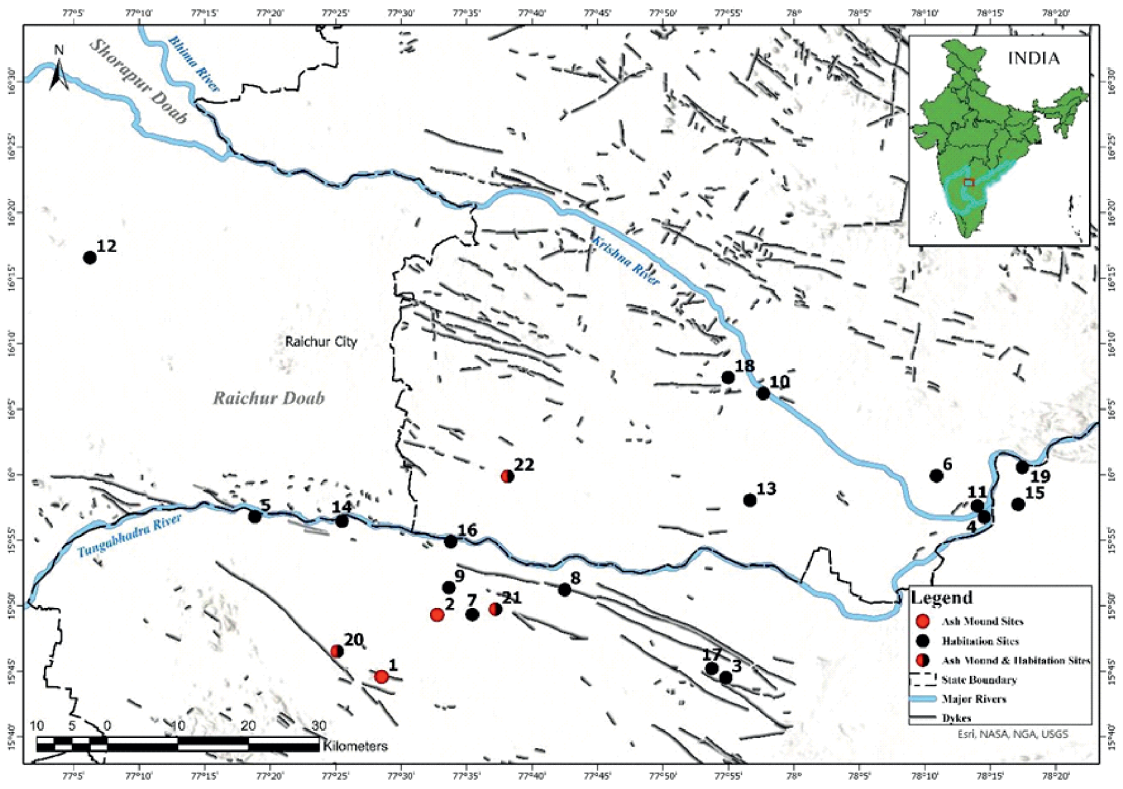

Figure 6: Dyke swarms and intrusive dyke formation the eastern Raichur Doab. Neolithic sites are much clustered in the dyke swarms near the Tungabhadra river. See Table 1 for site list.

Table 4: Distance estimation between the Neolithic sites and current river channels of Krishna and Tungabhadra. See with Figure 7.

Sl. No.	*Site*	*River*	*Proximity*	*Nature of the Site*
1	Gudikallu	Tungabhadra	19 km	Ashmound
2	Tsallakudluru	Tungabhadra	10 km	Ashmound
3	Budigepadu	Tungabhadra	16 km	Habitation
4	Chagaturu	Krishna	< 1 km	Habitation
5	Chetnepalli	Tungabhadra	< 1 km	Habitation
6	Chinnamaruru	Krishna	4 km	Habitation
7	Daivamdinne	Tungabhadra	9 km	Habitation
8	Inagandla	Tungabhadra	3 km	Habitation
9	Kanakavidupeta	Tungabhadra	6 km	Habitation
10	Karpakula	Krishna	< 1 km	Habitation
11	Kudavelli	Krishna	< 1 km	Habitation
12	Maladkal	Krishna	24 km	Habitation & Rock art
13	Manopadu	Tungabhadra	8.6 km	Habitation
14	Mantralayam	Tungabhadra	< 1 km	Habitation
15	Muravakonda	Krishna	3 km	Habitation
16	Nagaladinne	Tungabhadra	< 1 km	Habitation
17	Penchikalapadu	Tungabhadra	14 km	Habitation
18	Shaikpally	Krishna	2.5 km	Habitation
19	Veerapuram	Krishna	< 1 km	Habitation
20	H Maruvani	Tungabhadra	17 km	Ashmound & Habitation
21	Kambadahal	Tungabhadra	6.5 km	Ashmound & Habitation
22	Utnur	Tungabhadra	9.5 km	Ashmound & Habitation

From the context of river proximity, out of the twenty-two Neolithic sites in the study area (Table 4, Figure 7), seven sites like Veerapuram, Muravakonda, Kudavelli, Chagaturu, Chinnamaruru, Karpakula, Shaikaplly, are located within the proximity of < 5 km from the river Krishna. Maladkal is the only site, located 24 km south of river Krishna, with traces of habitational activity and Rock Art.

And rest of the sites are within the proximity of around < 20 km from the banks of river Tungabhadra. The sites which are located within the 5 km proximity from the banks of river Krishna are purely habitational in nature. There are no Ashmound sites on the bank of river Krishna. The seven sites, which are located within the proximity of 10 KM from the river Tungabhadra are purely Habitation sites. The two sites Penchikalapdu, Budigepadu are 14-16 km far away from the bank of river Tungabhadra and habitational in nature. The two Ashmound sites without any traces of habitational activity are found within the proximity of 10 - 20 km from the bank of river Tungabhadra.

There are other two sites, which reported traces of both habitational activity and ashmound that are located within the proximity of 10 km. H Maruvani is the only site, which is at a distance of 17 km from the bank of Tungabhadra and reported traces related to both ashmound and habitational activity.

Two major excavated sites in the study area are Utnur and Veerapuram. Utnur, an ashmound and habitation site located in the semi-arid uplands near the Tungabhadra River, is formed from reddish-brown loam soil and black cotton soils near the second-order streams. Accumulation of huge cattle dung as seen from the ashmound, abundant cattle hoof impressions, and remains of domesticated animals such as the Bos indicus, Capra hircus (goat), Ovis aries (sheep) show active animal husbandry, which must have been structured on the basis of annual seasons. Whereas the archaebotonical remains mostly centered on the summer crop types such as the foxtail millet, black gram, and horse gram,

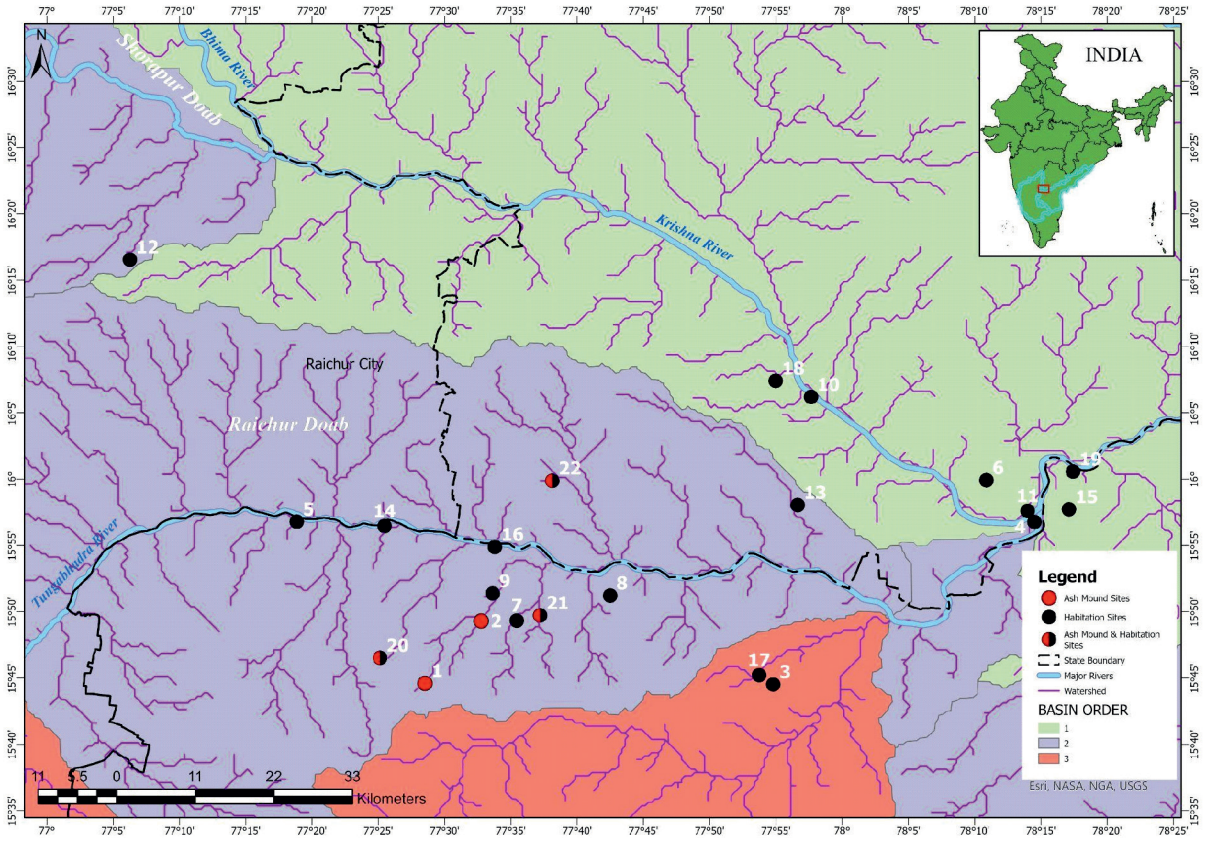

Figure 7: Neolithic sites in the narrow watershed confluence of Krishna-Tungabhadra. See Table 1 for site list.

suggest the season-based cultivation is exceptionally adaptable to extreme summers, and the existence of crops such as barley and rice, which require wet and humid environs, indicates a winter-dependent cultivation, which must have moved from the other agrarian villages. Similarly, Veerapuram, situated in the fertile floodplains of the Krishna-Tungabhadra, experiences a moderately humid environment (unlike Utnur), which likely supported the domestication of wet crops such as rice and barley. The environment must have further supplemented not only domesticated animals but also wild animals such as the deer. Abundant remains of non-edged tools, such as grinders and hammer stones, as well as bedrock mortars, suggest a robust agrarian economy compared to the animal husbandry-based economy. Based on the site locational pattern along with reported floral and faunal data from two excavated sites – from each cluster, the palaleo-environmental, archaeobotanical and faunal data suggests or indicates that, the sites distributed in two different clusters in eastern part of Raichur doab, exhibits two adaptive systems – one is agricultural and sedentary (Krishna – Tungabhadra confluence) and the other is pastoral and seasonal conditions (inlands of Krishna- Tungabhadra corridor). It suggests that there might be an interdependent subsistence network with pastoralists providing animal products and farmers producing cereals and legumes, facilitating the exchange of goods and cultural interactions. Similarly, the Kunderu tradition (see Fuller et al. 2000–2001) in the Kunderu river basin and the Halluru Tradition in the upper Tungabhadra basin (see Arjun 2024) are indicative of smaller regional-scale differential developments in sedentary villages.

Paddayya (2019) while studying in Neolithic sites in Shorapur Doab (Bhima-Krishna Doab), associated the ashmound sites, particularly with the water as resource-based locations, located close to seasonal streams or rivulets or rivers or nullahs or natural springs and having granite gneiss formations. Venkatasubbaiah (2011) linked limited water supplied smaller streams with the initial crop cultivation

methods and techniques during the early and middle phase of the southern Neolithic villages. Surveys in the western part of Raichur Doab (Arjun 2017, 2021) have identified that the spring fed residual hills of granodiorite formations developed the Neolithic sites into a full-fledged sedentary villages. The springs were tapped into water retention pools over the bedrocks, and the foothills of denudation formations must have tapped the water runoff into water aquifers/ pond kind of features. Whereas the Neolithic sites in the eastern Raichur Doab seem to have prioritised establishing their villages close to the banks of rivers Krishna and Tungabhadra. The preferable reason would be their reliance on agriculture as their primary occupation, which made them to look for a water source, supporting agricultural activity. Ashmound sites are located considerably far from the banks of river Tungabhadra, indicates that Neolithic people continued the practice pastoralism and factors like availability of green fodder for grazing the cattle might also be one of the probable reasons for changing their camping sites on the basis of seasonal variations.

There has been an increasing debate over crop suits, animal husbandry, and paleoclimate dynamics during the third and second millennia BCE (Arjun 2024). Though only two paleoclimate studies are suitably available, from a) Godavari estuary, which is part of the Core Monsoon Zone (CMZ), records an increase in aridity and adapted conditions of arid plants during 4000-1700 BP (Ponton et al. 2012). B) Lake sediments from a paleolake in Davangere, which borders the Eastern Dharwar Craton, located southwest of Raichur Doab, with the formations of gneissic hills and granodiorites indicating weakening of the Indian Summer Monsoon (ISM) during 4500 BP and fluctuating monsoon during 4500-3300 BP (Sandeep et. al. 2017). Monsoon cycles, a network of perennial and ephemeral streams, likely created a local ecology that shaped the cyclical patterns in cultivation and pastoralism. As a rain-shadowed region, Raichur Doab depends on the severe monsoonal rainfall in the western Ghats. However, in the eastern part of the Raichur Doab, located near the escarpments of the eastern Ghats, including the Nallamallai range and Kurnool-Cuddapah formations, precipitation must have been on a differential scale for the smaller regional Neolithic societies to practice their subsistence economy.

Therefore, the above discussion has led to conclude that the Neolithic sites in the Eastern part of Raichur Doab hold a distinctive pattern in adapting to local landscape and resources including but not limited to the geological, geomorphological and ecological features, which has substantially indicated our landscape studies, settlement patterns, and the cultural materials. There is a small scale inter-regional variation within the Neolithic villages of the western and eastern part of Raichur Doab and is completely distinct to those of Shorapur Doab.

Declaration of conflict of interest: The authors categorically state that they possess no conflict of interest.

Acknowledgement

This research was conducted by the first author for the post-graduation dissertation (unpublished) at the Department of History and Archaeology, Central University of Karnataka in 2023-2024 under the guidance of the second author. This manuscript is revised and updated in 2025 by the all authors for publication. The authors also thank the institutional support Central Library and the Conservation Laboratory of the Department of History and Archaeology, CUK. Thanks to the anonymous reviewers and journal editors of this publication for providing constructive reviews.

Competing Interest Statement

The authors declare that they have no competing interests

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