

GROUP OF SUOI BA ARCHAEOLOGICAL SITES (DAK NONG PROVINCE): DOCUMENTS, PERCEPTION, AND DISCUSSION

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Abstract

This article introduces the results of investigations and surveys from 2006 to 2017 of the group of Suoi Ba archaeological sites in Nhan Co commune, Dak R'Lap district (Dak Nong). The results reveal eight prehistoric archaeological sites in the Suoi Ba area, which are distributed over an area of about 20 hectares, equivalent to the size of an ancient village, and date from 3,500 to 2,000 years BP. In this study, the authors systematize materials, assess historical-cultural values, briefly outline the prehistoric cultural process at Suoi Ba during the late Neolithic and early Metal Age in Dak Nong, and discuss issues related to Suoi Ba relics in a broader context.

Keywords: Archaeology of Suoi Ba; Late Neolithic period; Prehistory of Dak Nong; Stone crafting; Triet Village culture.

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1. INTRODUCTION

The Suoi Ba archaeological sites belong to Hamlet 17, Nhan Co commune, Dak R'Lap district (Dak Nong). The evidence of prehistoric inhabitants has been found on both banks of the Suoi Ba. The discoveries were made primarily on hills not much higher than the stream. The terrain of these areas is relatively flat, so it was very convenient for the sedentary life of prehistoric people. The survey shows that most of the monuments and artifacts are concentrated in the fields of two men. The first location is on Mr. Nguyen Van Vinh's land at a latitude of 11°56'09" North, a longitude of 107°38'38.3" East and an elevation of 578 m above sea level. The second location, on Mr. Ha Van Minh's field, has coordinates of 11°56'12.0" North and 107°38'38.2" East with an elevation of 564.8 m above sea level. In the Nhan Co commune, Suoi Ba and Suoi Bon belong to the system of the Dak Rit stream, which is one of the upstream sources of water supply for the Dong Nai river. The meanders of the Suoi Ba and its tributaries hold many gently sloping point bars. There are abundant sources of materials, such as siliceous pebbles, basalt, sandstone, quartzite, etc. These were very convenient locations for prehistoric inhabitants to fetch water for domestic use, catch fish, and exploit raw materials to produce working tools.

The Suoi Ba archaeological sites have been known since 2005 with the preliminary announcement of Nguyen The Vinh's artifact collection (Nguyễn et al., 2008a, 2008b). These sites also have other names, such as Hamlet 17, Dak Rit stream, Suoi Ba.¹ The delegations from four organizations: the Vietnam Institute of Archeology, the Institute of Social Sciences of the Central Highlands, the DakNong Museum, and Dalat University made many visits to these places and determined that there are eight locations² where traces of prehistoric people can be found. The place where the urn grave was discovered proceeded as a "salvage excavation" in 2010 (Bảo tàng Đắk Nông, 2010). Together, six exploration pits were dug with a total area of 14 m² (Lê, 2014; Vũ et al., 2017). Initially, archaeologists identified the characteristics and features of the monuments and artifacts, provided dates, and made a preliminary assessment of the historical-cultural value of the Suoi Ba archaeological sites.

In this article, the authors briefly introduce Mr. Nguyen The Vinh's artifact collection and edit and present documents collected from re-investigations and reconnaissance at the Suoi Ba archaeological sites. The authors assess the historical-cultural value of the cultural relics, characteristics, features, and dating based on the literature. They also take the first step in identifying the position of the Suoi Ba sites in the prehistoric context of the Central Highlands and the Southeast region of Vietnam.

¹ In this article, we consistently use the term "Suoi Ba archaeological sites" (now in Thon Sau, Nhan Co commune) – this is a common name used by locals. It will be convenient for researchers or those interested in finding the site location.

² Belonging to the fields of these people: Nguyen The Vinh, Tran Van Hanh, Tran Sinh Trung, Hoang Van Thanh, Ha Van Toan, Ha Van Minh, Ms Lan, and on the inter-village road.

2. ARCHIVES OF THE SUOI BA ARCHAEOLOGICAL SITES

2.1. Discovery and research

The first Suoi Ba archaeological site was discovered by Mr. Nguyen The Vinh while growing coffee (Nguyễn et al., 2008a). Artifacts collected include trapezoidal axes with two sharp straight edges, trapezoidal axes with flat oval blades, quadrilateral axes with small handles, stone chisels, grinding tables, annular pieces, anvil stones, tektite fragments, opal flakes, prehistoric ceramics, etc. (Figure 1a-e).



(a)



(b)



(c)



(d)



(e)



(f)

Figure 1. Artifacts from the Suoi Ba sites (Dak R'Lap, Dak Nong)

Note: (a) Trapezoidal axes with two sharp straight sides; (b) Trapezoidal axes with flat oval blades; (c) Concave and grooved grinding tables; (d) Annular pieces; (e) Tektite fragments (from Nguyen The Vinh's collection); (f) An urn grave and grave goods excavated in 2010.

Source: 1a-e (Lê, 2014); 1f (Bảo tàng Đắk Nông, 2010).

An urn grave was discovered in 2010 in one area on the inter-village road running through the territory of Hamlet 17. A delegation from the Museum of Dak Nong Province conducted a “salvage excavation” of this urn grave (Figure 1f). Excavation showed that the tomb was buried about 40 to 50 cm below the current ground level. The urn was broken into pieces. Its mouth and upper part have collapsed. The lower body is 54 cm in diameter. The bottom is round with three pebbles on the bottom that form an isosceles triangle. The artifacts obtained include 36 stone objects (Table 1): 6 trapezoidal hoes, 6 quadrilateral axes, 1 incomplete quadrilateral axe, 3 raw stones, and 20 small pebbles with a thickness of 0.5 to 0.7 cm. These pebbles were layered consciously by the ancient inhabitants. In addition, there were also some sherds decorated with patterns of rope impressions and engraved lines that are entirely different from the typical sherds in the urn grave. The excavators believe that these sherds are from a specific grave good buried in the grave (Bảo tàng Đắk Nông, 2010).

In February 2013, a group of students from Dalat University inspected and dug two exploration pits at Suoi Ba (Trần et al., 2014). Stone objects and prehistoric ceramics³ were discovered in all six locations around the Suoi Ba area. Notably, many artifacts appeared on the surface at the farms of Mr. Nguyen The Vinh and Mr. Ha Van Minh. A 60-70 cm cultural layer was visible on the surface along the inter-village road bordering the land of Mr. Ha Van Minh. This layer contained many flakes and pieces of prehistoric ceramics. Artifacts collected during this investigation include 53 stone objects and 332 prehistoric sherds (Table 1).

In April 2013, Dak Nong Provincial Museum collaborated with the Vietnam Institute of Archaeology and the Institute of Social Sciences of the Central Highlands to conduct archaeological investigations covering the whole province of Dak Nong, including the Suoi Ba archaeological sites (Lê & Vũ, 2013).⁴ The trip’s primary purpose was to inspect all the archaeological locations and excavate to find new monuments and artifacts in the Dak R’Lap, Dak Mill, and Cu Jut districts. This trip documented the monuments and artifacts collected to construct an archaeological map of Dak Nong Province. In Nhan Co commune, the investigators have inspected, surveyed, and identified eight locations in the Suoi Ba area with traces of prehistoric people. The surveyors stated that the stone and ceramic artifacts are similar to those in Nguyen The Vinh’s collection in terms of materials, types, and manufacturing techniques (Lê et al., 2013).

³ The investigated and studied areas are in the fields of Nguyen The Vinh, Tran Van Hanh, Tran Sinh Trung, Ha Van Toan, Ha Van Minh, and Mrs. Lan.

⁴ There are no detailed statistics in this report on the artifacts collected.

Table 1. Statistics of stone and ceramic artifacts collected at the Suoi Ba sites

Year of investigations	Incomplete tools	Axes, adzes		Grinding tables	Mold pieces	Flakes/ flints	Anvil stones	Stones with drilling/ chiseling scars	Pebbles	Stone cores/ raw stones	Pottery wheels**	Sherds	Total
		Trapezoidal	Quadrilateral										
2010	1	6	6	0	0	0	0	0	20	3	0	0	36
2013	2	12	0	16	1	3	7	2	4	6	0	332	385
2017	0	2	2	4	0	11	3	0	7	4	1	136	170
Total	3	20	8	20	1	14	10	2	31	13	1	468	951

Note: In the table, the trapezoidal axes and adzes group includes axes and adzes with two sharp straight sides and those with a flat oval blade. We only separate the types in the analysis of artifacts.

*: Suoi Ba archaeological site has ceramic knobs, very similar to the handle of pottery wheels (ceramic-making tool). In this article, we temporarily classify it as a pottery wheel, and effort is needed to study more about the function of this artifact.

In May 2017, Dak Nong Provincial Museum announced the discovery of two adjacent ceramic circles on the inter-village road surface, most likely traces of an urn grave (Vũ et al., 2017). In December 2017, we investigated this area. We discovered several pieces of raw ceramic (Figure 2a), a quadrangular axe with full-body grinding, and ten prehistoric sherds (Figure 2b) lying next to the location where traces of the urn grave were found. These artifacts were likely buried with the dead person in the urn grave (Vũ et al., 2019). Traces of these prehistoric ceramics had been disturbed and destroyed by leveling of inter-village roads and natural erosion. Besides the location where the urn grave was discovered, we also studied the fields of Mr. Nguyen The Vinh, Ha Van Toan, and Ha Van Minh to determine the place where the exploration pit should be dug. The total artifacts collected from this trip are 33 stone objects, 1 pottery wheel, and 136 sherds (Table 1).



Figure 2. Stone and ceramic artifacts on the inter-village road at Suoi Ba (in 2017)

Note: (a) Sherds; (b) Quadrilateral axe.

Source: Vũ et al. (2017).

The data collected through re-investigations of the Suoi Ba archaeological sites indicate that the number of discovered artifacts is accurate. The artifacts consist of essential items, including trapezoidal axes and adzes, quadrilateral axes, and adzes with two sharp straight edges. Concave grinding tables (for blade grinding) and grooved grinding tables (for edge grinding and making picks) are typical. The grinding table material is mainly sandstone. Ceramics at Suoi Ba are typical of those from the Metal Age in the South Central Highlands region.

2.2. Reconnaissance at the Suoi Ba archaeological sites

2.2.1. Reconnaissance results (2013)

The code of exploration pit 1 is 13.NC.S3.TS1 and the coordinates are 11°56'9.6" North and 107°38'35.1" East (Trần et al., 2014). The exploration pit covers an area of 2 m² (1 × 2 m) and was dug in the field of Mr. Nguyen The Vinh. This pit is located on a hillside about 35 m from Suoi Ba and 1.5 m from the inter-village road. The terrain is slightly sloping towards the stream. The excavation method is to dig in layers 10 to 15 cm thick. Artifacts were collected and processed from each layer of excavation.

- The stratigraphic structure has an average thickness of 95 cm, consisting of three layers: (1) Layer 1 is 25-35 cm thick. This layer is disturbed due to the farming activities of modern residents. The soil contains many roots, coal, and raw stones. (2) Layer 2 is a cultural layer with an average thickness of 70 cm. The soil is dark brown and relatively porous. In this layer, there are incomplete tools, pieces of grinding axes, annular pieces, mold pieces, grinding tables, prehistoric sherds, bauxite ore gravel, laterite gravel, etc. (3) The bottom layer is composed of reddish brown basalt soil mixed with bauxite ore. In this layer, no archaeological artifacts were recorded (Figure 3).

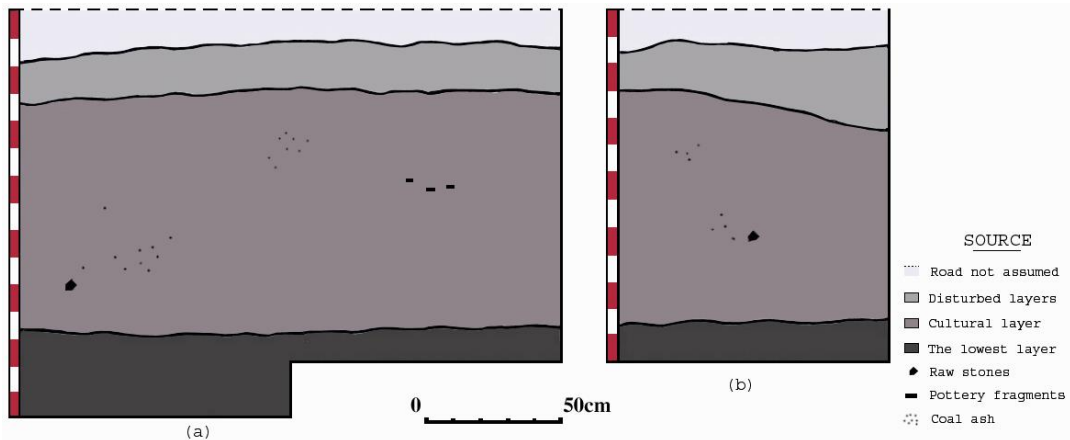


Figure 3. Exploration pit 1 at a Suoi Ba archaeological site (Dak R'Lap) in 2013

Note: (a) Stratigraphy of the east wall; (b) Stratigraphy of the south wall.

Source: Lê (2014).

- The artifacts collected in this exploration pit are 163 stone objects and 256 sherds (Table 2).

Exploration pit 2 has code 13.NC.S3.TS2 and coordinates 11°56'9.8" North and 107°38'34.4" East (Trần et al., 2014). Pit 2 covers an area of 2 m² (1 × 2 m) and was dug slightly to the west of Suoi Ba, about 20 m from pit 1 and about 25 m from the inter-village road. The terrain of exploration pit 2, which is an old floor of modern residents' house, is relatively flat. The cultural layer is intact. The excavation method was similar to that of exploration pit 1.

- The average thickness of the stratigraphy is 155 cm, consisting of three layers: (1) Layer 1 has two levels: Level 1 has an average thickness of 30-40 cm with basalt soil that is dark brown and relatively solid. This layer was disturbed due to the building of house floors by modern residents. No archaeological remains were found in this layer. Level 2 is 10-15 cm thick. Farming activities of the modern residents disturbed this layer. The soil texture is porous and contains many tree roots. (2) Layer 2, 90-95 cm thick, is a cultural layer of dark brown basalt soil that gradually turns reddish brown in the last layers. In this cultural layer, grinding axes, incomplete quadrangular axes, stone saws, grinding tables, annular pieces, prehistoric

ceramics, etc., were found. There was no evidence of archaeological remains in Layer 3.

- The number of artifacts collected in exploration pit 2 is 419 stone objects and 944 sherds (Table 2).

Table 2. Statistics of Suoi Ba artifacts collected in 2013

Locations	Axes, adzes			Stone saws	Stone chisels	Annular pieces	Grind- ing tables	Mold pieces	Pebbles	Flakes/ flints	Stone cores/ raw stones	Sherds	Total
	Trape- zoidal	Quadri- lateral	Grinding axe pieces										
Exploration pit 1	0	1	2	1	0	3	16	1	0	138	1	256	419
Exploration pit 2	1	4	0	1	2	2	10	0	15	377	7	944	1,193
Total	1	5	2	2	2	5	26	1	15	515	8	1,200	1,612

2.2.2. Reconnaissance results at Suoi Ba (2017)⁵

The code of exploration pit 1 is 17.T17.H1. Its coordinates are 11°56'09.8" North and 107°38'383.3" East, and its elevation is 578.3 m above sea level. Exploration pit 1 covers an area of 2 m² (2 × 1 m) and is located in Mr. Nguyen The Vinh's field. The pit was dug along the north-south direction on a low hillside that gradually slopes from west to east (Vũ et al., 2019; Vũ & Nguyễn, 2019).

- The average thickness of the stratigraphy is 115 cm. The structure: (1) The top layer is 12-30 cm thick. It is a brown basalt layer covered with hard, dry soil mixed with little archaeological remains and ash. This is the arable land layer of the modern inhabitants. (2) Layer 2 is a 65-95 cm thick cultural layer, divided into two levels. Level 1 is 25-35 cm thick. Its soil is grayish-brown basalt, spongy, and mixed with roots and ash. Level 2 has an average thickness of 60 cm. The soil of this level is also basalt but dark brown, hard with compacted soil texture, and mixed with bauxite ore. The cultural layer is intact with no evidence of disturbance. This layer produced incomplete tools, pebbles, raw stones, flakes, and sherds. (3) The lowest layer is composed of solid yellowish-brown laterite soil. It is rich in bauxite ore and has no archaeological remains.
- The number of artifacts collected is 45 stone objects and 88 prehistoric sherds (Table 3).

⁵ The group includes Dr. Le Xuan Hung, BA Nguyen Thanh Vuong (Dalat University); Ph.D. Vu Tien Duc (Institute of Social Sciences in the Central Highlands); BA Nguyen Anh Bang, BA Tran Thi Kieu Van, BA Nguyen Van Tran, and BA Doan Van Nhan (Museum of Dak Nong Province).

Exploration pit 2 has code 17.T17.H2 and coordinates 11°56'12.3" North and 107°38'63.8" East. Its elevation is 571 m above sea level (Vũ et al., 2019). Pit 2 was dug on the inter-village road, splitting a low mound opposite Mr. Nguyen The Vinh's field. This pit was dug where two pottery sherds appeared (May 2017) to check for remaining traces of the cultural layer. The reconnaissance area is 2 m² (2 × 1 m) in the east-west direction and about 15 m from Suoi Ba. The pit stratigraphy is a homogeneous layer of pale yellow basalt soil. It is mixed with laterite gravel without evidence of a cultural layer or archaeological remains.

The code of exploration pit 3 is 17.T17.H3. Its coordinates are 11°56'12.5" North and 107°38'39.2" East, and the elevation is 605.2 m above sea level. The pit is 4 m² (2 × 2 m) and located on the top of a low mound on the north side of Suoi Ba. This location is in the field of Mr. Ha Van Toan. The pit surface is relatively flat (Vũ et al., 2019).

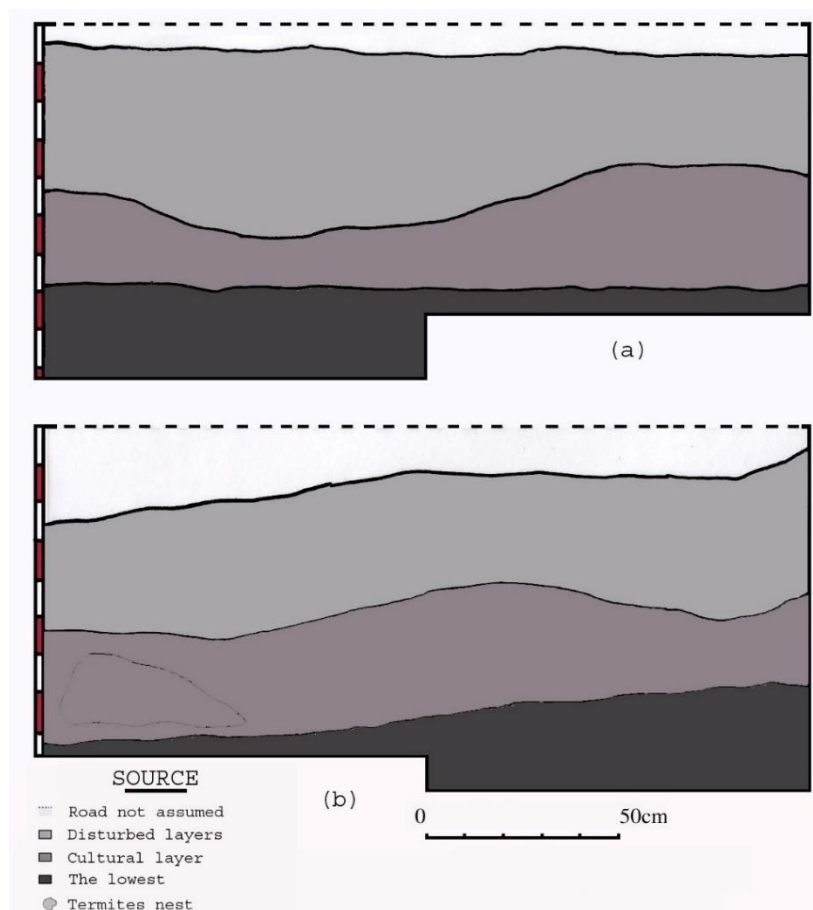


Figure 4. Stratigraphy of exploration pit 3 (2017)

Note: (a) Stratigraphy of the east wall; (b) Stratigraphy of the south wall.

Source: Vũ et al. (2017).

- The average thickness of the stratigraphy is 65 cm. The structure is divided as: (1) The top layer, which is 30-40 cm thick, is the arable land of the modern residents. The soil is dark brown, porous, and mixed with humus, ash, and many roots. In layer 1, a few sherds and sandstone grinding table pieces were

obtained. (2) Layer 2 is an intact cultural layer with an average thickness of 18-35 cm and a slight tilt from east to west. The pit's east wall has a reddish brown color; the soil is porous and contains a lot of ash. The west wall is light brown. The soil texture is tight, lumpy, and complex. In this cultural layer, a few raw ceramics and sandstones were found. (3) The bottom layer is reddish brown. Its structure is tight, hard, and mixed with laterite gravel with no archaeological remains (Figure 4).

- The number of artifacts in exploration pit 3 is 2 stone objects and 8 sherds (Table 3).

Table 3. Statistics of Suoi Ba artifacts collected from a reconnaissance in 2017

Locations	Incomplete tools	Axes, adzes	Grinding tables	Picks	Flakes/flints	Anvil stones	Pebbles	Stone cores/raw stones	Sherds	Crockery pieces	Total
Exploration pit 1	1	1	1	1	33	1	3	4	88	0	133
Exploration pit 2	0	0	0	0	0	0	0	0	0	0	0
Exploration pit 3	0	0	0	0	0	0	0	2	8	0	10
Exploration pit 4	0	0	0	2	4	0	0	2	9	1	18
Total	1	1	1	3	37	1	3	8	105	1	161

Exploration pit 4 has the code of 17.T17.H4 with coordinates of 11°56'12.0" North and 107°38'38.2" East. Its elevation is 564.8 m above sea level. The pit is located 2 m from the inter-village road and 1.5 m higher than the road surface on a low hill in Mr. Ha Van Minh's field. The pit area is 2 m² (1 × 2 m) and was dug from northside to southside (Vũ et al., 2019).

- The stratigraphic layer is 110-125 cm thick with a three-layer structure. (1) The surface layer, which is 10-45 cm thick, was disturbed by the agricultural activities of modern residents. The soil is grayish brown and mixed with ash and tree roots. Its texture is loamy and porous. Some raw ceramic pieces were found in this layer. (2) Layer 2 is an intact cultural layer with an average thickness of 95 cm divided into two levels: Level 1 has an average thickness of 30 cm and is reddish brown and solid. It contains little ash, tree roots, and raw ceramic artifacts. Level 2 is composed of reddish brown soil with a tight, pure, and well-hydrated texture. The soil contains natural ceramic pieces, coal ash, bauxite ore gravel, and plant roots. (3) The lowest layer consists of reddish brown basalt soil mixed with laterite gravel and bauxite ore gravel. The soil structure is tight, well-hydrated, and free of archaeological remains.

- Artifacts collected in exploration pit 4 are 8 stone objects, 9 prehistoric sherds, and 1 crockery piece (Table 3).

3. CHARACTERISTICS, FEATURES, AND DATING OF MONUMENTS AND ARTIFACTS

3.1. Features of the monuments

The Suoi Ba archaeological sites cover a large area. They are evidence of an ancient community with a long continuous residence time of thousands of years. Prehistoric inhabitants often resided on the mounds and hillsides on both Suoi Ba banks, near water sources and raw stones for mining and making tools. The excavation results of the six exploration pits shows that these locations all have disturbed layers 10-65 cm thick. The cultural layer is intact and has a thickness of 60-95 cm. It is composed of basalt sediments, pure soil, and bauxite gravel. The soil structure becomes tighter and more hydrate with depth into the biogeographic layer. The bottom layer contains much bauxite ore gravel larger than those of the cultural layer (Figure 5). The discovered monuments and artifacts are not far apart in the Suoi Ba area. They are closely related to each other in a prehistoric cultural context.



Figure 5. Stratigraphy of exploration pit 1, 2017

Source: Vŭ et al. (2017).

Through reconnaissance, artifacts found in the cultural layer are stone tools, grinding tables, saw blades, anvil stones, flakes, prehistoric ceramics, and modern ceramics (in the disturbed layer), a few stone cores, and incomplete tools. In general, the

remains were evenly distributed in the excavated layers but more concentrated in the middle part of the cultural layer. Technical characteristics of the stone tools and pottery show the chronological order of the cultural layer. Artifacts in Mr. Nguyen The Vinh's collection and artifacts collected from investigations and scouting trips at the Suoi Ba archaeological sites are homogeneous materials, types, and manufacturing techniques.

In the exploration pits, the group of the grinding table is rich in types and materials. Sherds (1,305 pieces/14 m²), pieces of jewelry, pebbles with traces of grinding, and coal ash show proof of residence at the Suoi Ba archaeological sites. In addition to living, Suoi Ba was also a place to bury the dead. The ancient inhabitants in this area thought about the afterlife, and pieces of evidence are burial goods. For example, in the urn grave (Bảo tàng Đắk Nông, 2010), there were 13 axes and adzes (Figure 1f), small pebbles with grinding marks (which might be ceramic-making tools or items used in the counting system of ancient inhabitants), and battle axes in the collection of Nguyen The Vinh. This document exhibits the wealth and status of the tomb owner – a “chief” in the prehistoric community.

In particular, the number of grinding tables in Mr. Nguyen The Vinh's collection is extensive and rich in types: flat/concave/grooved grinding tables, anvil stones, and natural pebbles with many striking/hitting scars, etc. This indicates that Suoi Ba residents manufactured tools locally to serve the community's urgent needs. Documents include incomplete annular pieces and finished ones in Mr. Nguyen The Vinh's collection (Figure 1d) and from exploration pits (Figure 7d). The grinding tables (jewelry grinding) show that they also knew how to make jewelry. Other documents, such as the appearance of polished pebbles (Figure 7a) and the pottery wheel handles (Figure 9e), also testify to pottery-making activity at the Suoi Ba archaeological sites.

3.2. Characteristics of the artifacts

The number of artifacts collected from reconnaissance and investigations at the Suoi Ba sites is 846 stone and 1,775 ceramic objects (Table 4).

Table 4. Statistics of stone and ceramic artifacts at Suoi Ba

Number	Type	Quantity	Total	Percentage	
1	Tools, working tools	Incomplete tools	4	206	7.85%
		Axes, adzes	133		
		Axe pieces	2		
		Picks	3		
		Stone saws	2		
		Stone chisels	2		
		Grinding tables	47		
		Anvil stones	11		
		Mold pieces	2		

Table 4. Statistics of stone and ceramic artifacts at Suoi Ba (cont.)

Number	Type		Quantity	Total	Percentage
2	Jewelry	Annular pieces	5	5	0.19%
3	Materials, raw materials	Stones with drilling/chiseling scars	2	635	24.22%
		Pebbles with grinding scars	38		
		Flakes/flints	566		
		Stone cores/ raw stones	29		
4	Ceramics	Pottery wheels	1	1,775	67.72%
		Raw ceramic pieces	1,773		
		Crockery pieces	1		
	Total		2,621		100%

The total number of stone artifacts is 846, including tools, working tools with 206 artifacts (accounting for 23.84%), jewelry with 5 artifacts (accounting for 0.57%), materials, and raw materials with 635 artifacts (accounting for 75.05%). Some of the features are as follows:

The group of axes and adzes has a total of 133 artifacts.⁶ In which there are 82 trapezoidal axes and adzes (accounting for 61.65%), 44 quadrilateral axes and adzes (accounting for 33.08%), 5 sloping-shouldered axes (accounting for 3.75%), 1 square-shouldered axe (accounting for 0.75%), and 1 blade-sharpening axe (accounting for 0.75%). Statistics show:

- Trapezoidal axes and adzes are the most typical artifacts of the Suoi Ba archaeological site. This group of tools is divided into two types: (1) Trapezoidal axes and adzes have a flat oval shape with an elongated body (accounting for about 2/3 of the collection). The tool handle is usually large and tapers slightly to the edge of the convex blade. The tool is generally thick in the middle of the body and gradually becomes thinner at the edges. Techniques for shaping and repairing the tool body were primary flaking and secondary flaking techniques, flake scars from both sides, and radial. The outside of the tool is covered with a thick weathered layer so that no grinding marks are visible (Figure 6a). The crafting material of the axes and adzes is 100% stream pebbles from locally exploited rivers. These pebbles are usually long, flat, oval-like, and fit the size of the artifact. The primary material of the tool is quartzite, minor basalt, and modified silic (2) Trapezoidal axes and adzes with two sharp straight edges, for which the whole body was sharpened. The tool body is long, and the handle is smaller than the curved

⁶ In the collection of Mr. Nguyen The Vinh (statistics in 2013) there are 97 artifacts: 61 trapezoidal and 30 quadrilateral axes and adzes, 5 sloping-shouldered axes, and 1 square-shouldered axe. The collection from investigations and reconnaissance has 36 artifacts (21 trapezoidal axes and adzes, 14 quadrilateral axes and adzes, and 1 blade-sharpening axe). Note that in Mr. Nguyen The Vinh's collection there are thousands of stone and ceramic artifacts. However, during the field trips, the authors did not have the opportunity to make statistics and sufficient documents for the artifacts. We will study and update the archive of this collection in another study.

edge of the blade (Figure 1a). The primary crafting materials of this group of tools are basalt, siliceous rocks, and aleurolite. This type of artifact is prevalent and found in the Dak R'Lap district and the South Central Highlands.

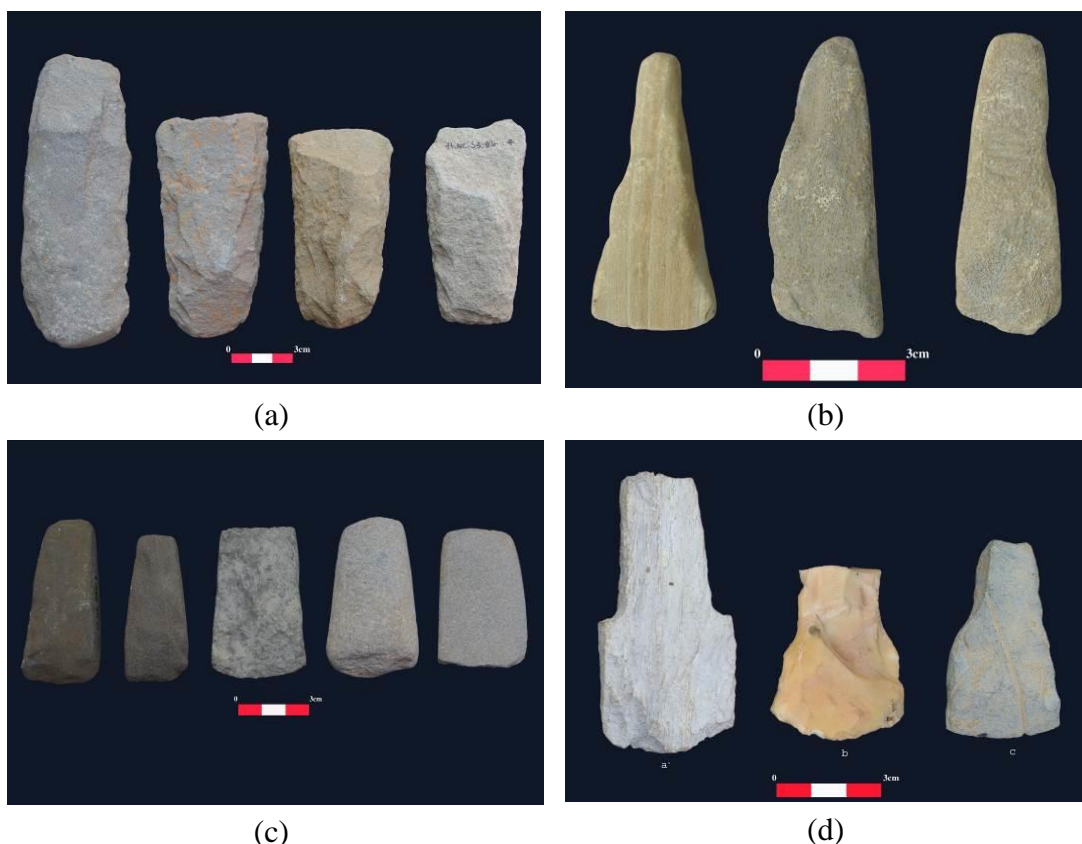


Figure 6. Stone objects collected at the Suoi Ba archaeological sites in 2013

Note: (a) Trapezoidal axes with flat oval shape (2013); (b) Quadrilateral axes with a long, thin body; (c) Quadrilateral axes with a short body; (d) Axes with sloping and square shoulders (Nguyen The Vinh's collection).
Source: Lê (2014).

- Quadrilateral axes and adzes account for many artifacts in the collection. These artifacts were ground all over the body and covered with traces of clams that had not been sharpened yet. The outside was covered with a thick gray or gray-white weathered layer. The tool handle is flat and tapered. The body is long, thick in the middle, and beveled thinly on the sides down to the edge. The edge of the blade is wide and sharp. The two sides were ground straight (Figure 6b). Crafting materials are mainly basalt with sedimentary origin. This type of artifact is widespread in the Buon Triet monument (Dak Lak). In addition, in Nguyen The Vinh's collection, there is also a group of quadrilateral axes and adzes that were full-body sharpened with a rectangular flat handle smaller than the blade's edge. The body of the tool is thick and beveled evenly down the blade. The two edges of the tool are straight and sharp (Figure 6c). The primary processing material is basalt. This type is very

similar to artifacts of the same kind discovered in Lam Dong, Dong Nai, and Binh Phuoc provinces.

- In addition, at the Suoi Ba sites, axes and adzes with sloping and square shoulders (Figure 6d) made from opal, basalt, and siliceous rocks were also found though not expected. These artifacts were discovered scattered throughout the Dak R’Lap district, especially in the Nghia Trang Hill monument and a group of monuments in the town of Kien Duc (Nguyễn, 2007a).

Incomplete tools in the exploration pits at the Suoi Ba archaeological sites are scarce (4 artifacts). These are fragments from the tool body, or tools that had not been shaped or were faulty because the manufacturing process could not continue, so they were left at the monument. The two prominent faces of the artifacts have large flake scars, deeply concave into the body. The edges of the sides have modified flake scars but are still rough.

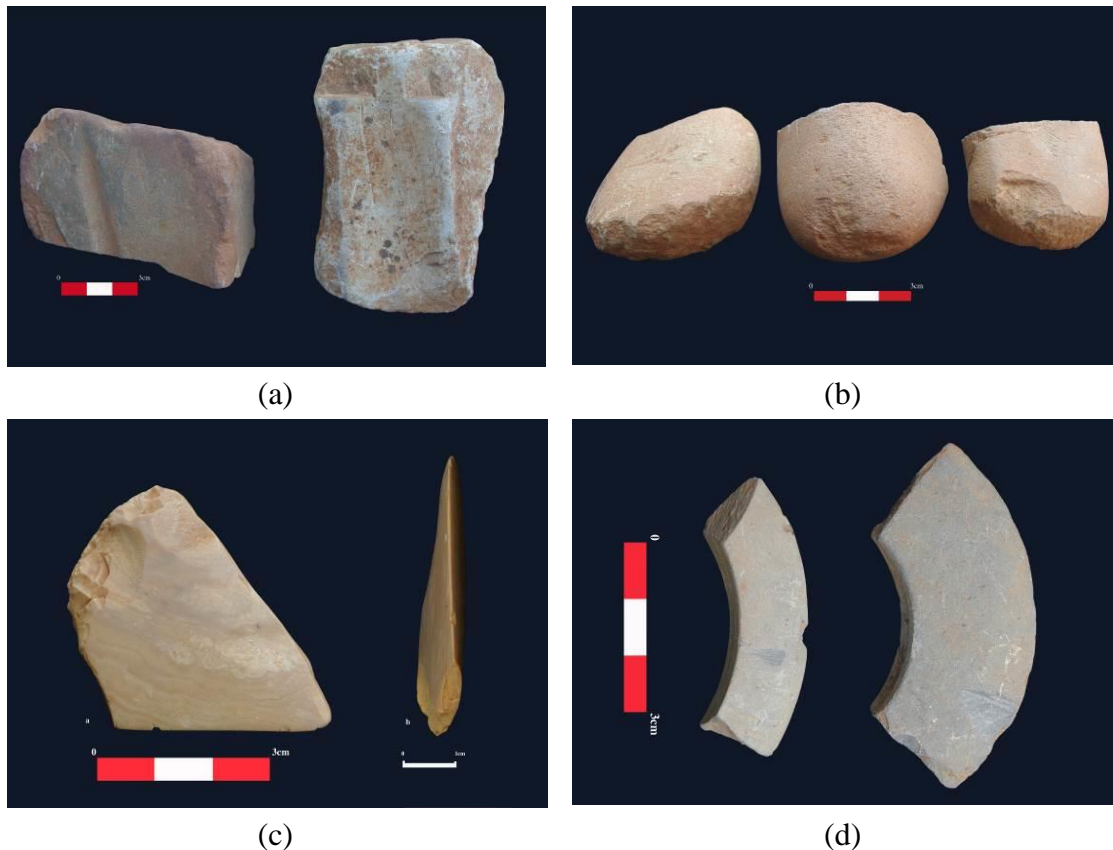


Figure 7. Stone objects collected from investigations and reconnaissance at Suoi Ba (2003)

Note: (a) Grooved and concave grinding tables; (b) Anvil stones (from the investigation); (c) Saw blades from exploration pit 2; (d) Annular pieces from excavation pit 1.

Source: Lê (2014).

The grinding table group also accounts for a large number of artifacts in the Suoi Ba artifact collection (5.55% of the total collection). The grinding tables here have different sizes and are rich in types, such as flat, concave, edged, slot (Figure 7a), and inner grinding tables. Sometimes, grinding wheels had many functions, such as sharpening the blade, edge, or tip. The primary material of the grinding wheels is fine to very fine-grained sandstone. Modified quartzite, siltstone, and modified silica were used to polish artifacts but were not as common as sandstone.

The number of anvil stones in the excavation pits is limited but accounts for a vast number in the investigation collection and Mr. Nguyen The Vinh's collection. The anvil stones are thick oval-shaped pebbles. There are many anvil stones with one end broken across the body; the other end has flake scars from making tools. The common materials of this group of artifacts are quartzite, silic, and sandstone. On the body of some artifacts, there are still traces of using one or more techniques in the manufacturing process, such as anvil scars on many sides and traces of flaking/pecking (Figure 7b).

Two stone saws were discovered in exploration pits 1 and 2 in 2013. (1) The first saw blade, given code 13.NC.S3.TS1:8, is a piece of pebble made of quartzite. The exterior of the stone saw has a tan weathered layer. One side of the saw blade is relatively flat (a fine split). The other side is raised in the middle of the body, forming a longitudinal ridge parallel to the blade's edge. The blade body is straight with traces of wear. Its primary function is as a saw, but it can also be used as an edge grinder. (2) The second stone saw, made from a light yellow opal flake, was discovered in exploration pit 2 in 2013. One tip is tapered relative to the blade's edge and has modified flake scars. The blade edge is straight. A double-sided chamfer creates a sharp blade edge with smooth wear marks. Both sides were ground, but some unrefined traces are still visible (Figure 7c). In some prehistoric sites in the Central Highlands, stone saw blades have been discovered, which was not expected (Lê, 2020).

In addition to the group of tools mentioned above, the Suoi Ba artifact collection also includes annular pieces (Figure 7d), incomplete disc-shaped pieces, and unfinished annular pieces. The crafting material is schist stone. Small pebbles with traces of grinding found in urns and cultural strata are abraded on one or more surfaces (Figure 8a). They were possibly used as a polishing tool for surface fabrication, as has been noted at many monuments in the Central Highlands (Lê, 2015; Lê, 2018; Lê, 2019a; Nguyễn, 2007b; Trần, 2008). Stone monuments have traces of drilling and chiseling from both ends into the center (Figure 8b). A small number of mold fragments were found but not identified from a mold of any product. Of particular note is that in the collection of Nguyen The Vinh, we have recorded some pieces of tektite modified with drilling scars, the function of which is currently unknown (Figure 8c).

In all, 29 artifacts, including stone cores and raw stones, were collected from investigations and reconnaissance. Some cores were produced during fragmentation (Figure 8d), and the rest are in situ pebbles or have flaking/pecking scars. The primary material is quartzite from the river and stream pebbles that are abundant in the locality.

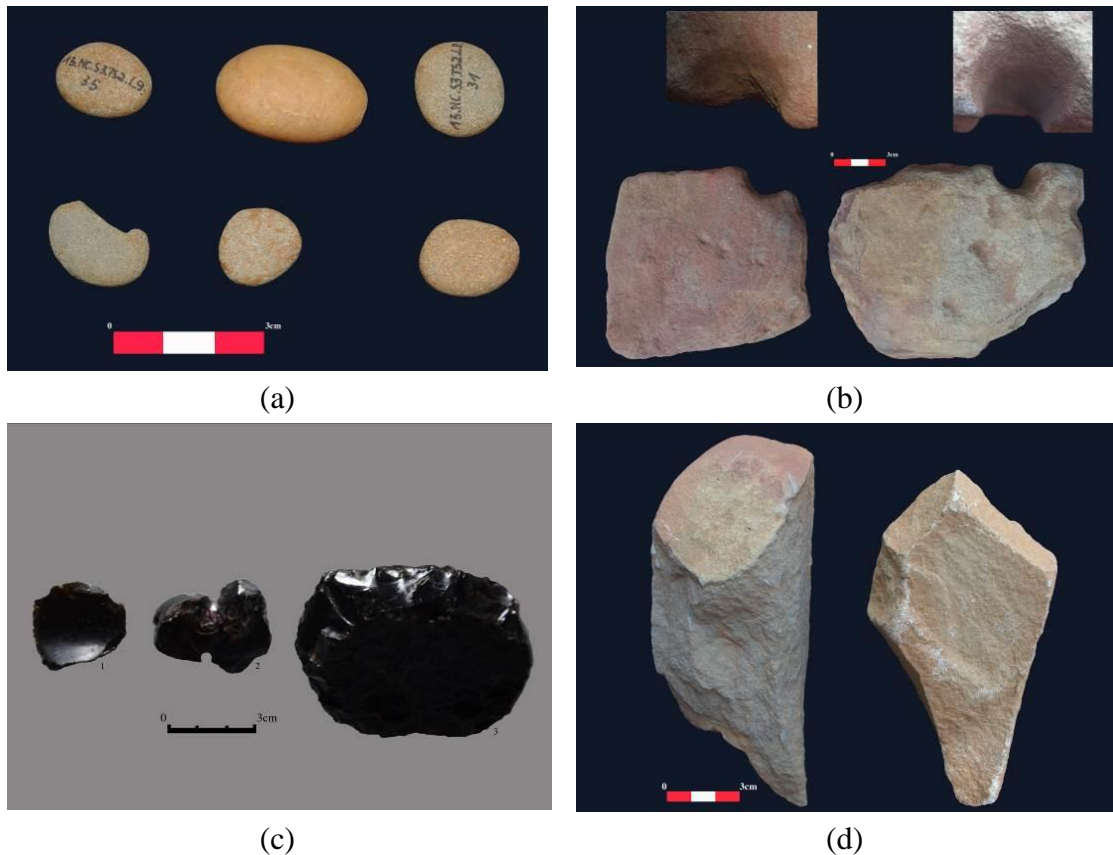


Figure 8. Stone objects collected from investigations and reconnaissance at Suoi Ba (2013)

Note: (a) Pebbles from exploration pit 2; (b) Stones with drilling/chiseling scars; (c) Tektites with drilling/flaking scars (Nguyen The Vinh's collection); (d) Stone cores (investigations).

Source: Lê (2014).

The flake group has 566 pieces. Most flakes are secondary ones that average 2-3 cm in size, and there is no natural pebble crust. A few collected items, with an average size of 3-5 cm, still keep their pebble crusts. Some of the pieces have grinding traces on one side, which was separated during the re-flaking of the tool. The material of the flakes is almost entirely quartzite, which is suitable for the group of tools typical of the monument. The other materials are aleurolite, basalt, and sandstone.

Ceramic: The typical ceramic at the Suoi Ba archaeological sites is a bare ceramic with a slightly thick wall. Ceramic coats occur in brown, sepia, and dark gray. There are two basic types of ceramic. The first type is a raw and sandy ceramic flecked with white scales. The second type is dark gray and rough with clay mixed with many plant fibers. This ceramic type usually has a pattern of brush strokes, rope lines, straw holes, checkered carvings, seashell edges, etc. (Figure 9a). Suoi Ba ceramics are mainly household pottery, such as bowls, pots, vases, jars, etc. (Figure 9b-d). Many pottery pieces still show evidence of cooking activity (smoke marks). Ceramic coffins for burying the dead are not common in the South Central Highlands, but in Suoi Ba, an urn grave was discovered in 2010, along with many stone burial goods. Another urn grave was found in 2017 (Vũ et

al., 2017). This type of burial has also been found in monuments, such as Buon Triet (Lak district), Dha Prong (city of Buon Ma Thuot), or Buon Rau in Dak Lak Province (Krong Pac district) (Figure 9e) (S. K. Nguyễn, 2004; Trần, 2002; Trần et al., 1994; Trần & Nguyễn, 2008).

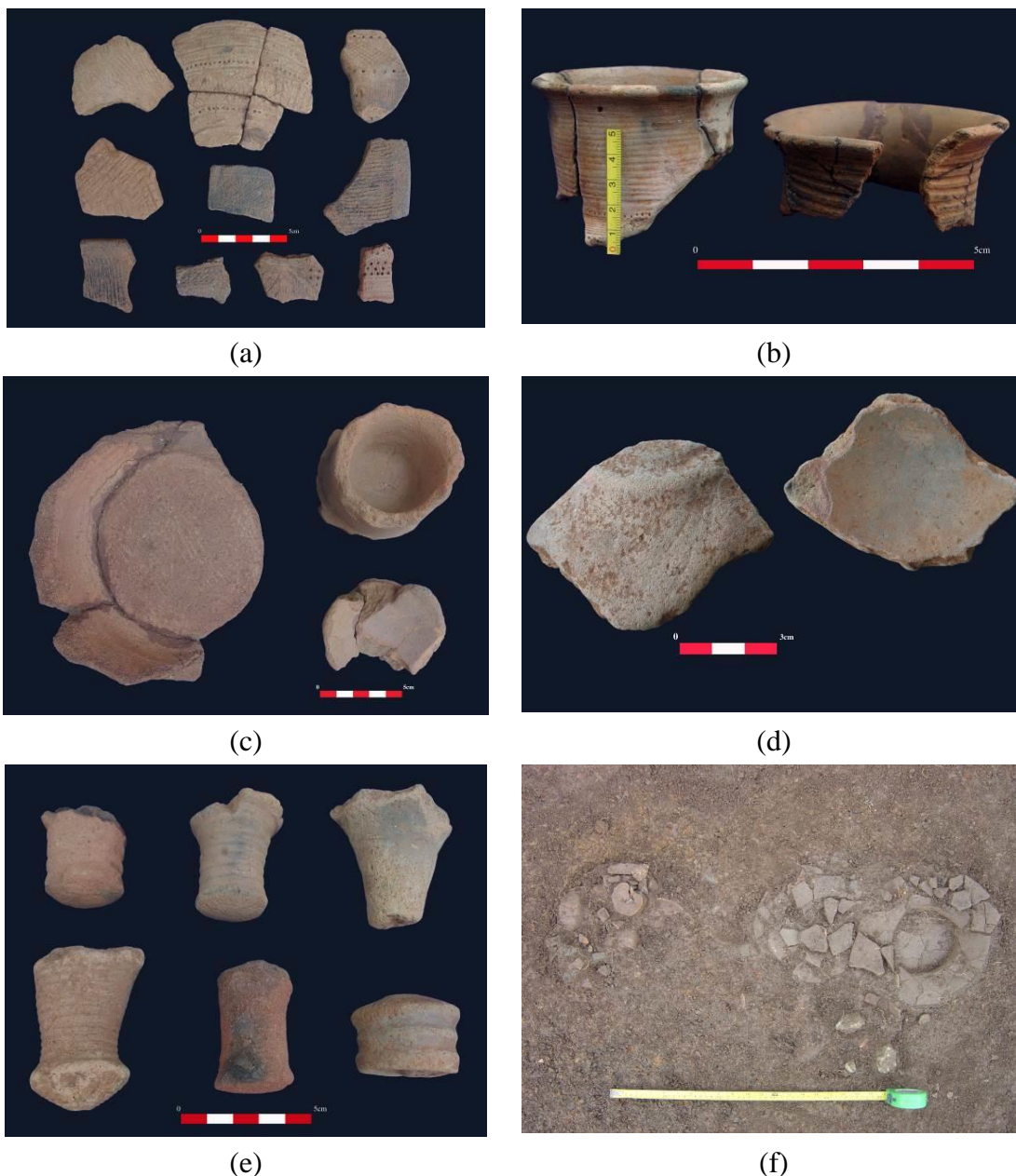


Figure 9. Ceramics from Suoi Ba (Dak Nong) and urn graves at the Buon Rau site (Dak Lak)

Note: (a) Patterns; (b) Ceramic mouth-rims; (c) Bases; (d) Ceramic bowls; (e) Ceramic knobs (Nguyen The Vinh's collection); (f) The urn grave and grave goods.

Source: (a)-(e) Lê (2014); (f) Phạm (2015).

In addition, there are also rough, firm, and often smooth ceramics. Decorative patterns are circles running around the shoulder or neck to form bands (Figures 9b and 9e). They are checkered inside with parallel vertical lines or sometimes dotted with decorative straw holes on the ceramic vase and broken knobs. This type of ceramic has been commonly found in some monuments in Lam Dong and the Southeast region (Trần & Lê, 2007), and it has similarities with the ceramic of the pre-Oc Eo period (Nguyễn et al., 2008a).

3.3. Dating of the Suoi Ba sites

Relative dating: The absolute dating system (C^{14}) was used to date Lung Leng culture objects (Nguyễn, 2005), including 15 samples from the Plei Krong lake bed (Kon Tum) (S. K. Nguyễn, 2014), 3 samples from the Buon Kieu site (Dak Lak) (Nguyễn et al., 2015), and 2 samples from the stone tool factory in Lam Dong (Lê, 2019b). These samples range in age from 4,500 to 2,000 years BP. The dates correspond to the period from the Late Neolithic to the end of the Iron Age in the Central Highlands. Among artifacts collected from the Suoi Ba archaeological sites, stone objects show the perfection of processing techniques, such as primary flaking, grinding, sawing, drilling, and polishing artifacts. Ceramic high flammability is very solid. Polished ceramics are in large quantities. Inhabitants used beautiful decorative patterns with schemes running around the body, and patterns engraved with parallel lines running into ribbons around the body. Shapes and designs are various. In particular, the urn grave excavated in 2010, and the collection of buried stone items are typical of the Late Neolithic-Early Metal Age in the South Central Highlands. The authors believe that dates for the Suoi Ba sites from the beginning of the Neolithic period to the early years of the first century AD are reasonable with the current documents collected.

Absolute dating: In 2015, we sent a coal sample to be analyzed by the radiocarbon method (C^{14}) at the Laboratory of Isotope Hydrology, Ho Chi Minh City Center for Nuclear Technologies. The analysis gave an age of $1,980 \pm 110$ years BP. The sample, with code 13.NC.S3.TS1.L5, was excavated from the fifth layer 52 cm below the surface. This depth is equivalent to the latest layer of the cultural stratum. (The average thickness of the cultural layer is 85 cm; the stratigraphy is from 110-155 cm thick.) According to the results of the above analysis, the authors believe that the Suoi Ba sites date to 3,500-2,000 years BP.

4. DISCUSSION

Based on obtained documents, reconnaissance and excavations were conducted at archaeological sites and thousands of stone and ceramic artifacts were collected. By studying the stratigraphy, classifying the types of tools, and the characteristics of the tool materials, archaeologists have identified and divided prehistoric cultural zones in Dak Lak and Dak Nong provinces (Đ. G. Nguyễn, 2004). The authors agree that the prehistoric inhabitants of Dak Nong had a close relationship with the prehistoric inhabitants of Dak Lak Province (S. K. Nguyễn, 2004).

The Neolithic was the period when early agriculture appeared. Along with agricultural activities, grinding and ceramic-making techniques arose, but the main livelihood of the prehistoric inhabitants was still hunting and gathering. This period saw a change in people's attitudes towards nature; people were more active in exploiting nature and gradually became its conquerors.

Due to material limitations (separation of stratigraphy and absolute dating) in the Central Highlands, the Neolithic cannot be divided between early, middle, and late periods. Therefore, Vietnamese archaeologists usually divide it into two phases: Early Neolithic and Late Neolithic (Glover & Bellwood, 2004, pp. 177-188; Lê, 2019a). In the South Central Highlands, monuments dating back to the Early Neolithic have been discovered at Buon Kieu, Buon Hang 1C, and Ho Tre in Dak Lak Province (Lương et al., 2020; Nguyễn et al., 2015; Phạm et al., 2019; Phạm & Vũ, 2015), at Thon Tam in Cu Jut district (Lê, 2013; Lê & Nguyễn, 2008), and in Dak Nong Global Geopark (Lê et al., 2018; Nguyễn et al., 2020). The typical stone tools of these monuments are blade-sharpened axes of the Bac Son culture, oval axes, short axes, etc. The raw ceramics have thick walls and low calcination. The question is whether these monuments and artifacts belong to the Late Neolithic-Early Metal Age⁷ in Dak Nong and the South Central Highlands. According to the sources, opal flakes appeared in the late cultural layer in all of the above monuments. A surface investigation at the Buon Kieu site revealed a collection of trapezoidal hoes typical of the Late Neolithic-Early Metal period in the area. Opal flakes and pieces of stone axes are common artifacts in the South Central Highlands stone tool factories (Lê, 2015).

When studying the tools collected at the Thon Tam site, the authors found a group of long oval axes that are small at the tip and slightly wider on the body and edge of the blade, which is a remarkable feature. Perhaps this is a technical development in stone tools. These long oval tools are the “precursors of the quadrilateral axes” of the Late Neolithic-Early Metal Age in the Central Highlands.

Typical stone tools at the Suoi Ba sites are trapezoidal axes with a flat oval-shaped blade. This group of artifacts has many similarities in manufacturing technique with the collection of long elliptical tools at the Thon Tam site (secondary flaking technique, thick in the middle of the body, and thinly chamfered to the edges with a long oblong shape). The primary materials for crafting are river and stream pebbles. However, it must be emphasized that the crafting technique at the Suoi Ba sites is more advanced than at Thon Tam. Small modified strokes appear systematically on the whole body, the edges, and the blade at Suoi Ba. The question is whether the manufacturing techniques and source of materials at Suoi Ba are related to the early Neolithic site at Thon Tam in the sense of “inheritance and origin.” In terms of dating, the early cultural layer of the Suoi Ba

⁷ Due to limited resources, the separation between the Stone Age and the Metal Age in the Central Highlands is unclear. Therefore, the term Late Neolithic-Early Metal Age is commonly used in the study of prehistory in the Central Highlands. The focus of this period was on perfecting the techniques of stonework and ceramics, building factory centers with subregional characteristics, establishing “archaeological cultures,” etc.

archaeological sites belongs to the Late Neolithic-Early Metal Age. However, the prehistoric inhabitants of Suoi Ba still preserved the tool-making tradition of the early Neolithic sites.

In general, in the South Central Highlands, monuments dating back to the Late Neolithic-Early Metal Age are scattered over all types of terrain and are highly concentrated in the districts of Lak, Krong Pac, Ea Kar, and Buon Ma Thuot (Dak Lak), Lam Ha (Lam Dong), Krong No, Cu Jut, Dak R'Lap, and the city of Gia Nghia (Dak Nong). The monuments are distributed in terrain favorable for living activities, such as forks/intersections of rivers and streams, lakes/lagoons, and hills/mounds near the water source. This is favorable for defending against natural disasters, harvesting food on land and under water, exploiting raw materials such as stone and clay, etc. These serve the crafting process in the prehistoric socio-economic structure. And, on a specific scale, there is a common cultural space.

Research at the Suoi Ba sites and other monuments in the Dak R'Lap area show similarities and relationships in origin. The first similarity is the material, which is basalt used to make quadrangular axes and trapezoidal axes. Grinding wheels are also similar in material, type, and tooling characteristics. Almost all sites have produced axes with sloping and square shoulders (although these are not common) and opal flakes. Ceramics have similarities in manufacturing techniques and types of patterns and designs. The Suoi Bon archaeological sites in Nhan Dao commune is one source that provided finished tools for local residences in Dak R'Lap and prehistoric monuments in Dak Nong (Lê & Phan, 2014).

From the research results at the Suoi Ba sites and the prehistoric sites in Dak Nong, we believe that the prehistoric residents lived and settled there in the Late Neolithic-Early Metal Age. Hunting and gathering were the main activities, but they knew about crop farming. Agriculture using hoes is evidenced by agricultural tools, such as quadrilateral hoes with long or short bodies and hoes with square or pointed shoulders and long thin bodies. All tools found in the monuments are convincing evidence for agricultural activities. Research by Lê (2019a) on agricultural activities using hoes has shown that:

Hoes are not only abundant in quantity but also rich in type. Different hoes have been discovered in various terrains, showing that agricultural activities using hoes were vibrant and diverse. Stone hoes shaped like buffalo teeth account for a large number of artifacts at the North Central Highlands archaeological sites. This type of hoe was made from phthalate stone and was polished all over its body. The body of the hoe is long, thick, and narrow. The front is flat or concave; the back is curved with a prominent ridge in the middle. The body is nearly triangular in cross-section. The handle is small and the blade is curled evenly. This type of hoe is absent in Dak Lak, Dak Nong, and Lam Dong. The type of hoe with a rectangular body and small shoulder was usually made of siliceous rock. Other types have square or pointed shoulders, a thin body, a wide blade, and a smoothly-polished body. This type of hoe was found in the North and South Central Highlands. This type of hoe is found in the greatest concentrations in the monuments of the North Central Highlands (p. 61).

In a broader context, the Suoi Ba archaeological sites also have ceramic knobs that are very similar to the handles of a pottery wheel (Figure 9e). The handle of the artifact was decorated with circles running around the body. The tops of some ceramic knobs were decorated with engraved patterns consisting of straight lines from the outside to the center. Some artifacts have vertical holes through the center of the handle, similar to some artifacts found in Cat Tien (Lam Dong Province). By comparing these types of artifacts with those from Suoi Linh, Vinh Cuu district (Dong Nai Province) and Phu My monument, Cat Tien district (Lam Dong Province), etc., Vũ and Nguyễn (2019) stated that they have many similarities in terms of type with artifacts found in Suoi Ba. Another study concluded that the Suoi Ba ceramics belong to the Late Dong Nai-Early Oc Eo period (T. T. S. Nguyễn, 2014).

The authors agree that these stone and ceramic artifacts have many similarities with those from the Southeast. Especially, the ceramic pot with small size, flared mouth, constricted neck, hollow body, and convex base is very similar to pottery of the Can Gio culture in the Southeast region (Phạm, 2015). Types of stone artifacts at the Suoi Ba sites are typical of the South Central Highlands cultural region. They also reflect a close relationship with many other regions in the Central Highlands, especially Dak Lak and the Southeast region (Lê, 2016; Lê et al., 2011; Nguyễn, 2007a; Trần et al., 2014). Suoi Ba was “the intersection” between Buon Triet and Dong Nai cultures in prehistoric times (Vũ & Nguyễn, 2019).

These relationships are also reflected in the burial rites of the dead. Ceramic coffins were very common in the North Central Highlands, especially in the Lung Leng culture in Kon Tum (Nguyễn, 2007a; T. T. S. Nguyễn, 2014). This suggests a particular contact between two groups of residents in the North and South Central Highlands in the Early-Middle Bronze Age through the custom of burying the dead in ceramic coffins.

More research is needed in both archaeological and interdisciplinary fields to have convincing answers to the relationships between monuments and artifacts from the same region or across different regions. The application of nuclear research methods and techniques traces the origin of raw materials and the relationship between materials and artifacts. The relation of artifacts in one region with those from other areas is an important research topic nowadays in Dak Nong, the Central Highlands, and the Southeast.

5. CONCLUSION

With current documents and data collected to date in Dak Nong Province, about 50 archaeological sites have been discovered, providing evidence for the Late Neolithic-Early Metal Age. These sites are mainly concentrated in Dak R’Lap, Krong No, and Cu Jut. Research shows that prehistoric inhabitants of this period commonly used quadrangle/trapezoidal hoes and axes made of basalt, trapezoidal axes crafted from river and stream quartzite pebbles, and round anvil stones perforated in the middle. Terracotta ceramics mixed with sand and plant materials were processed into household products with the main decorative patterns being rope impressions, brush strokes, and engraved lines. We agree that the monuments discovered and studied in the above areas belong to

the Buon Triet culture (Nguyễn, 2007a). This culture is distributed in the southern Central Highlands, in the Krong Pac and Lak districts (Dak Lak), and in Krong No, Cu Jut, Dak Mil, the city of Gia Nghia, and Dak R’Lap (Dak Nong). The Suoi Ba archaeological sites belong to the Buon Triet culture and have a close relationship with the Late Neolithic-Early Metal Age monuments in the Central Highlands.

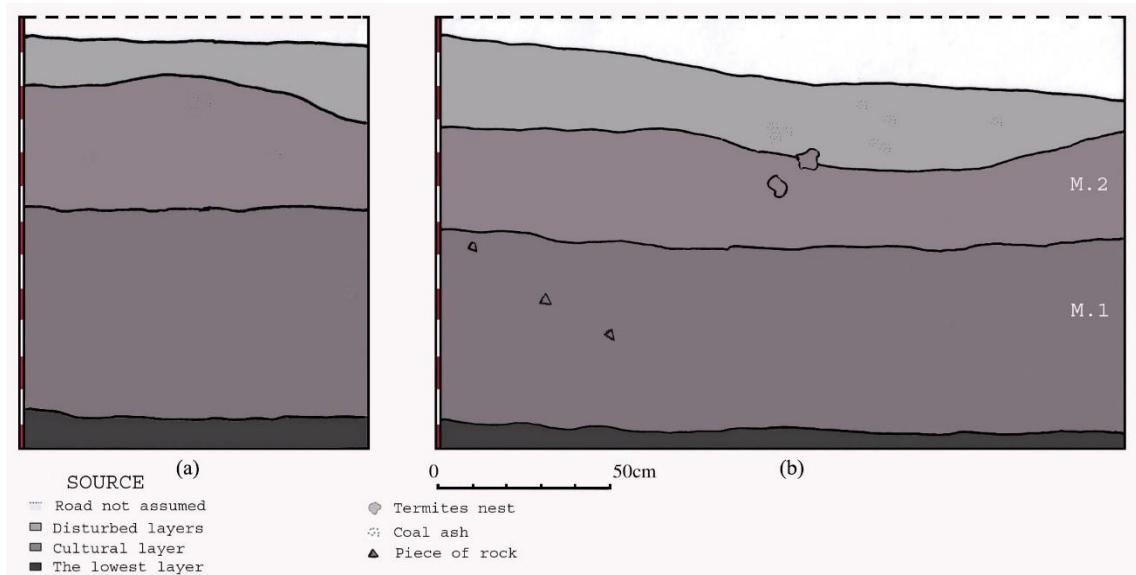


Figure 10. Cultural layer of exploration pit 1 (2017)

Note: (a) The early cultural layer; (b) The late cultural layer.

Source: Vũ et al. (2017).

In Dak R’Lap district, 31 sites of the Late Neolithic-Early Metal Age have been discovered and studied. The Doi Nghia Trang site was excavated in 1994, and seven other sites were inspected in the town of Kien Duc and Nhan Co commune. With the Suoi Ba archaeological sites and the standard features of the Buon Triet culture, Suoi Ba also shows the influence and cultural transition between the southern Central Highlands and the Southeast in prehistoric times. Based on the characteristics of the stratigraphy, monuments, and artifacts, the authors believe that the Suoi Ba sites had two levels of culture from early to late (Figures 5 and 10), as follows:

- The early cultural layer has a range of dates from about 3,500 to 2,700 years BP. There are trapezoidal axes in this level, made of river and stream quartzite pebbles having a flat oval shape. Quadrilateral axes and sloping-shouldered axes were not expected, but were found. Trapezoidal axes were discovered in the seventh of nine layers excavated in exploration pit 2 at the stratigraphic depth of 95 cm in 2013. Oval axes were found in the eleventh level of exploration pit 1 in 2017. This pit has 12 excavation layers and an average stratigraphic depth of 110 cm.
- The late cultural layer dates to 2,700-2,000 years BP. Typical tools of this level are trapezoidal axes with two sharp straight sides that were ground over the entire body. The sloping-shouldered axes were made of siltstone and opal,

similar to artifacts of the same type at the Taiper monument, Bien Ho, Gia Lai Province (Nguyễn & Phan, 2007) or at Chu K'tu, Dak Lak Province (Nguyễn & Lê, 2007). Ceramics are typical for the Metal Age in the southern Central Highlands.

In conclusion, the continuous process of investigating, discovering, and researching prehistoric archaeological monuments aims to construct archaeological maps. These maps serve the purpose of conservation, research, and education in terms of history and culture. Promoting the value of the archaeological heritage in socio-economic development is a necessary job of cultural managers in Dak Nong and other provinces in the Central Highlands.

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