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The Environment in Prehistoric Research: A Case Study of the Kortallayar Basin, Tamil Nadu

Shanti Pappu

INTRODUCTION

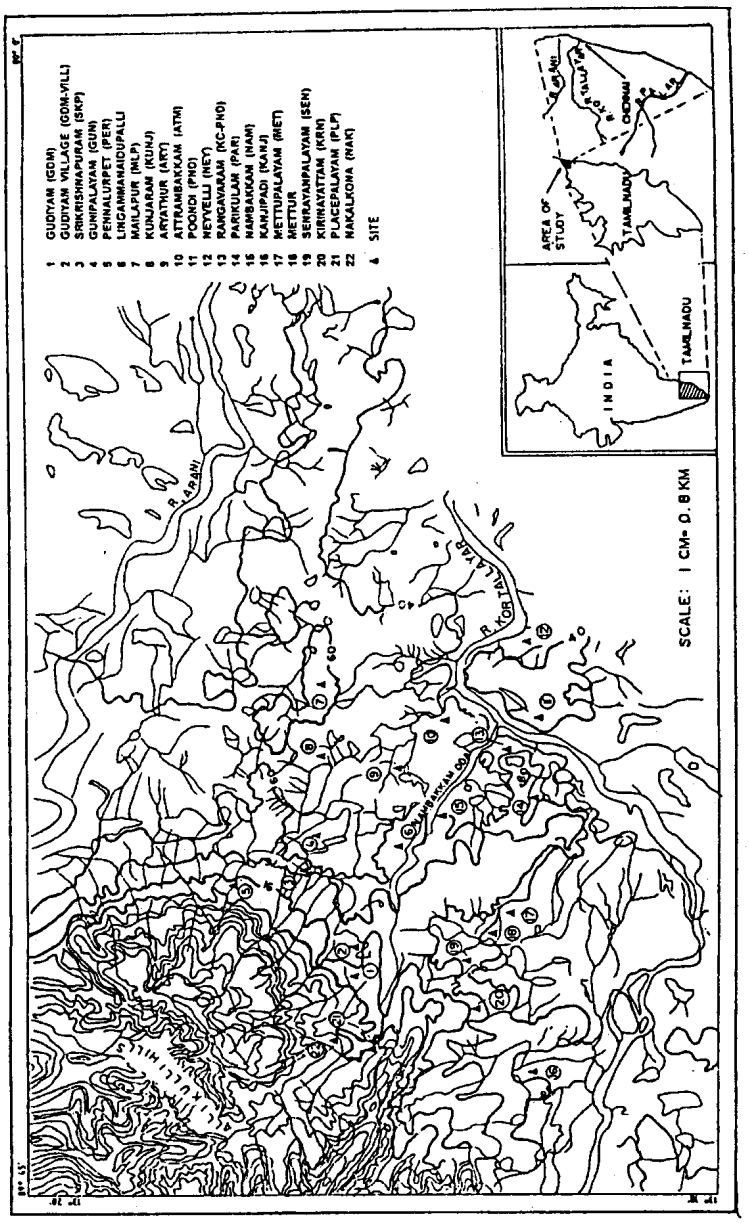
Ever since the birth of Indian prehistory in 1863, the environment has featured as an important subject in the study of past cultures. Conceptual approaches in the archaeological study of the environment vary greatly (Alland 1975; Bennett 1978; Bettinger 1991; Butzer 1982; Ellen 1982; Hardesty 1980; Harpending and Davis 1978; Kirch 1980), although they all aim at understanding interrelationships between prehistoric societies and changing environments. In Indian prehistory, two principal approaches can be identified. The first approach documents Quaternary climatic, geomorphic and biotic processes at archaeologically rich sites and regions (Deo 1991; see Pappu 1995; Rajaguru 1993; see Statira *et al* 1995). The second approach utilizes this data along with archaeological evidence and models adapted from human ecology and geography to study past hominid land-

use patterns and adaptive strategies (Allchin *et al* 1978; Cooper 1992; Misra 1989; Misra and Rajaguru 1989; Murty 1978-79; Paddayya 1979; Raju 1988; Sharma and Clark 1983). This approach may also involve a consideration of environmental impacts on the formation and preservation of Palaeolithic sites.

This article falls within the second category of research. It examines the way in which environment can be used in Palaeolithic archaeology drawing on a case study conducted in the Kortallayar basin, Tamil Nadu. For this purpose, environment is conceived of as encompassing both natural elements (physical geography, climate, biota) and cultural elements (archaeological sites and present cultural geography), which influence the formation of sites, hominid settlements and subsistence strategies. The paucity of fossil fauna and flora necessitated the use of uniformitarian assumptions drawn from the studies in geomorphology, ecology, ethnography and experimental research to put forward some general observations on past man-land relationships.

The Landscape Approach: Regional Scales of Analysis

Hominid adaptation to changing environment results in the differential use of places across a landscape, which in turn, conditions the structure of archaeological sites. This necessitates the adoption of a regional or landscape approach by the archaeologist, whereby the distribution of artifacts across a region can be studied. The study region consists of an area of 200 sq. km. (79°40′ : 79°56′ E and 13°17′ : 13°10′ N) in the Kortallayar basin, which forms a part of the Palar basin, Chengai-Anna District of Tamil Nadu (see Fig. 2:1). This comprises the Satyavedu plantation surface consisting of the north-northeast and south-southwest trending Allikulli hill ranges (200-380 m AMSL), surrounded by undulating lowlands (Muralidharan *et al* 1993). The area is drained by the Kortallayar river (a fourth order stream) and a network of first, second and third order streams. The region falls in an area of wet tropical moderate climate and uneven rainfall regime with an annual range of 105-125 cm., characterized by cyclonic rains from September to November and a mean temperature of 36°C. Vegetation consists of the *Albizzia amara* and *Acacia* series of semi-evergreen scrub, woodland, closed and discontinuous thorny thickets and scattered shrubs (Gaussen *et al* 1964).



Map 2.1 : Kortallayar Basin

The focus in this paper is on palaeoenvironments vis-a-vis early hominid adaptations in the Kortallayar Basin basing on the archaeologically visible residues (the artefact scatters). In cultural terms this represents the Palaeolithic and Mesolithic cultures. This study proceeds by an analysis of the distribution of artefacts across the landscape in differing zones (defined by elevation and sedimentary context) and by plotting them, taking into consideration both high density artefact clusters or 'sites' and 'off-sites' or isolated scatters of artefacts (Dunnel and Dancey 1983; Ebert 1986; Foley 1981).

Reconstructing Quaternary Environment

As human kind evolved during the Pleistocene (the first epoch of the Quaternary, the second being the Holocene — the most recent), a meticulous scientific study of these deposits is crucial for an interpretation of the palaeoenvironments. Quaternary deposits in the Palar basin consist of the Erumaivettipalayam surface (fluvial-erosional comprising lateritic gravel), and the Palar-Kortallayar formation (comprising channel-bar, channel-fill, channel lag, flood basin, levee, pointbar and terrace deposits), ranging in age from the Middle Pleistocene to the Holocene (Muralidharan *et al* 1993: 9). Within the study area, weathering of the bedrock clasts, winnowing of their siliceous and ferruginous matrix as well as erosion of Tertiary ferricretes were the principal processes contributing to the source material in the form of gravels, silts, sands and clays, which constitute the Pleistocene deposits in the region. Subsequent transport and deposition by colluvial processes, sheet and stream floods and stream channel processes, followed by weathering of the profiles and ferricritization, has resulted in the formation of the Pleistocene landscape (Pappu 1996a; 1996b).

Quaternary ferricretes or ferricritized gravels containing, in general, Late Acheulian to Middle Palaeolithic artefacts, disconformably overlie the bedrock. Ferruginous gravels (30cm to 4.10m thick) vary greatly in age and in the factors responsible for their deposition and subsequent reworking. Two phases of Quaternary ferricretes are noted. Older ferricretes contain Acheulian to Middle Palaeolithic tools. These are 1.5m to 2.5m thick and comprise mainly coarse sands to silts with a few outsize

clasts and pebble lenses. Chemical analyses of ferricretes reveal that in general the Fe_2O_3 values are low (13.40 per cent to 26.39 per cent) reflective of immature ferricretes with weak mobilization of iron, lithodependency on parent material and pointing to a predominant role of groundwater in a zone with a fluctuating water table (Subramaniam and Mani 1981; Tardy 1993). Iron is derived from the ferruginous matrix of the Sriperumbudur and Satyavedu formations, and from Tertiary ferricretes. The principal zones represented include the cuirasse and the superficial dismantling horizon. Subsequent dismantling and transport of the duricrust is attributed to block gliding and thermal breakdown.

A 50cm thick deposit of clayey silts is noted overlying ferricretes and covering an area of 4 sq.km. These are capped by ferricrete lag and sheet gravel containing Late Middle Palaeolithic to Microlithic tools. Holocene deposits comprise a 1.2m thick deposit of alluvium of the Kortallayar and Arani rivers, and are archaeologically sterile. Gullies dissecting these deposits can be dated to the Early Holocene humid phase (Rajaguru *et al* 1993: 463). A sub-fossil bone of *Boselephas tragocamelus* (Pappu *et al* 1994) was found and dated to the Middle Holocene. Climatological and geomorphological studies point to the existence of drier climate through most of the Pleistocene, although ferricrete formation points to greater humidity and pronounced seasonality during the Middle Pleistocene (Pappu 1996b; Rajaguru *et al* 1991). In the absence of any organic material, further generalization are to be avoided at this stage.

The Archaeological Record

A total of 22 sites belonging to the Lower (i.e. Acheulian) and Middle Palaeolithic and the Mesolithic were studied. Prior to reconstructing past life, the impact of environmental processes on the formation of the Palaeolithic sites needs to be considered.

Site Taphonymy

Post-depositional processes influencing artefact distribution and morphology include a combination of geomorphic processes (fluvial, gravitational, soil formation, neotectonic), biogenic

processes, as well as current and historical land use patterns. These condition the nature of the sample available for the archaeologist and thus influence interpretations of the hominid behaviour (Binford 1982; Goldberg *et al* 1993; Issac 1989; Nash and Petraglia 1987; Schick 1974; Schiffer 1987; Stein 1987; Stern 1993). Variables considered for this study included site sedimentary contexts, horizontal and spatial distribution of artefacts, and artefact morphology (size, shape, abrasion, weathering, rounding, patination). Based on these parameters sites were classified into different types on the basis of their sedimentary context and potential for informing about hominid behaviour. These fall into a continuum between sites possessing a high degree of integrity, indicating areas of hominid activity in varying degrees; moderately reworked sites, where natural processes have operated with a greater intensity; and sites which are completely reworked or in unclear contexts. It was seen that the process of ferricrete formation, duricrust dismantling, atrefact raw material types and the process of iron encrusting, all play an important role in influencing the integrity of sites. Thus caution should be exercised when commenting on the factors thought to arise from hominid behaviour.

Stone Tool Technology

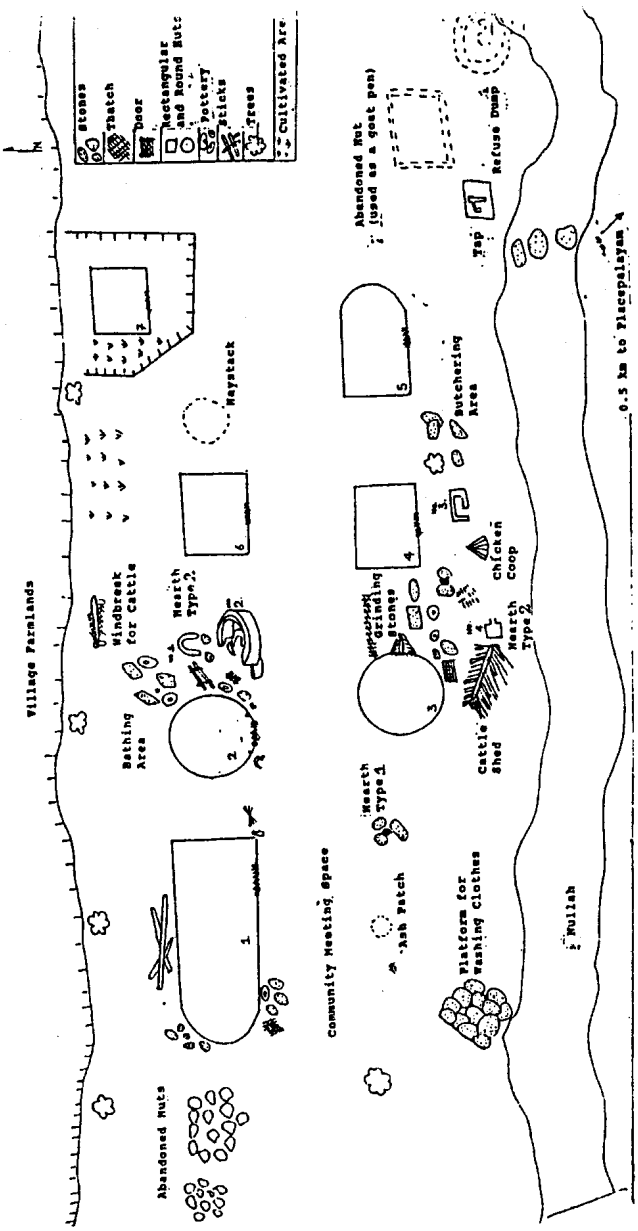
An analysis of 2012 Middle Palaeolithic stone tools in terms of studying their manufacture, use, transport, reuse and discard was attempted. Raw materials comprised of quartzites, quartzitic sandstones, sandstones, and quartz cobbles, pebbles, nodules and thermal fracture flakes derived from weathered bedrock. Choices were exercised as regards the nature of raw material and type of clast preferred. Although no site is more than a distance of 4 km from raw material sources, geomorphic processes and hominid exploitation through time, affected the distribution and ease of accessibility of these sources. Thus while bedrock could be easily exploited by the earlier Acheulian groups, during the Middle Palaeolithic this was buried by ferricretes in some regions. Through time, gravels deposited by seasonal sheet floods or stream floods built up new sources of raw material. Variation in the type of blanks used for the manufacture of tools (cobbles, pebbles, thermal fracture

flakes, cortical, non-cortical flakes, prepared core flakes, flake-blades, blades, debitage, older tools) are noted in different regions with a predominance of the first four types in regions close to raw material sources. This may be associated with strategies with raw material conservation (Andrefsky 1994; Montet-White and Holen 1988). Artefact sizes correspond largely to the size of locally available raw materials; thus where there are larger natural clasts larger tools are noted. Sites having smaller clasts also display a lower frequency of the Levallois element and more naturally backed flakes. Lithological studies point to transport of clasts, cores and flake across the landscape (see Pappu 1996b).

Modified cobbles and trimmed nodules representing early stages in the reduction sequence are found at almost all sites, but no site bears evidence of preliminary raw material trimming and core reduction. Cores are few in number at all sites and are of many types (Levallois, discoidal, flake, flake-blade and blade). In some cases, broken cores have been rechipped and converted into other tools. Differences in the type of debitage, i.e. whether a result of early or late stage trimming is noted. A wide range of tool types is also seen. Standardization of forms is generally low, and in some cases debitage and thermal fracture flakes have been rechipped and used. Retouch is mild, causes for tool discard are unclear, as excluding blades very few tools are broken. Reuse of older tools is seen.

The Environment and Modern Hunter-Gatherers

Analogies drawn from modern hunter-gatherer settlement and subsistence strategies, and general principles of human ecology are utilized to discuss alternate adaptive strategies and their possible archaeological correlates. For this purpose a study of the Irulas (inhabiting the study region) and other South Indian and Sri Lankan foragers was considered. Despite shortcomings associated with the use of analogies drawn from such 'acculturated' foragers, it is felt that a general flexibility has enabled this mode of life to survive and thus, principles linking hunting, sharing, politics and social life are relevant here. Particular emphasis was laid on understanding Irula and other hunter-gatherer settlement and mobility strategies, subsistence strategies, technology and their



Map 2.2 : Activity Areas

material correlates, as these are thought to have validity in understanding the archaeological record.

Among the Irula settlements within the study region, Placepalayam was chosen due to its remote location and relative freedom from influences of the village life. This comprises of 17 adults and 11 children including two elders, their wives and offsprings, inhabiting seven huts spread over an area of 1500 sq.m. Detailed maps of activity areas and artefacts were made (Fig. 2.2). In addition to this settlement, night hunting camps were noted. These are leaf shelters, each of which can house two men and which are located within a radius of 10 km. in the forest and inhabited during the summer months for snaring game. Irulas in other regions (Ananda Bhanu and Saheb 1983; Thamizoli 1994; Thamizoli and Sudarsen 1994; Thurston 1993; Zvelebil 1988) also remember a time when mobility was greater and when rock shelters and single- and multi-chambered caverns were regularly occupied in the seasonal round. Irula subsistence strategies at Placepalayam involve 6-7 months of hunting and gathering small game and plant food; the remaining months being spent in agricultural labour. Foraging is largely opportunistic and with a generalized search and encounter strategy.

Alternate Settlement and Subsistence Strategies and their Archaeological Correlates

Studies focussed on the Irulas, Vaddas, Malapandarams, Allars, Arandans, Eravallans, Malakkaran, Yanadis, Kadars and Chenchus among others reveal that settlement patterns are variable with strategies ranging from sedentary permanent multi-family residential base camps with foraging locations and seasonally occupied logistic camps (Irulas) to varying degrees of residential mobility, with or without aggregation or territoriality. All groups follow a pattern of seasonal transhumance, with relatively fluid membership, weak territoriality and patterns of aggregation and dispersion which depend on the availability of water, game and other factors, such as, inter-cultural pressure and kinship patterns (Ananda Bhanu 1989; Deraniyagala 1993; Ehrenfels 1952; Fox 1969; Fuchs 1973; Furer-Haimendorf 1943; Jebadhas and Noble 1989; Luiz 1963; Morris 1982; Raghaviah 1962).

Types of sites, their sizes and spatial organization were next considered in terms of the effect they may have on assemblage composition. At the first level, differences in the assemblage composition arising from whether a site is a residential camp, a special purpose site, or a foraging loci were considered (following Binford 1982; Chatters 1987; Kelly 1992; Kent 1991; Winterhalder and Smith 1981). At the second level, systems of mobility-residential versus logistic, were considered and possible assemblage composition arising from such systems were discussed. Depending on the type of mobility, technological organization as reflected in whether tool-kits are transportable, versatile, flexible or economical of raw material was examined. Tools were looked at from the point of view of whether they reflect expedient or curated strategies of manufacture. Variables considered included recycling, reuse, resharpening and causes for discard (Bamforth 1986). Causes of reoccupation or multiple occupation of a site and the effect on site size and artefact density were examined. With respect to subsistence strategies, most of the groups studied follow a generalized immediate return strategy with a search and encounter mode (Woodburn 1982). Expectations on possible technological organization were then put forward.

Reconstructing Palaeolithic Man-Land Relationships

Taking into consideration these expectations, the following general observations are made about the past man-land relationships.

Site Types

Site types are difficult to determine owing to the fact that localities may have been used differently through time as necessitated by change in resource structure, social composition and mobility strategies. Based on expectations considered earlier, two broad categories of residential sites and varying categories of special purpose sites were identified within systems of logistic or residential mobility. These included (a) short-term foraging sites, including find spots representing possibly short-term foraging/ collecting episodes (Placepalayam jungles, Nakalkona, Kirinayattam); (b) short-term special purpose camps (Placepalayam,

Senrayanpalayam). Other sites possibly represent residential base camps. The latter display evidence of early and later stages of core reduction and artefact trimming. The sites of Aryathur and Attrambakkam display evidence of preliminary trimming of the cores, high artefact diversity, and a higher percentage of debitage to tools. Debitage is never commensurate with the number of finished tools suggesting considerable movement of tools across the landscape. Sites like Attrambakkam and Aryathur with high artefact densities within small areas could possibly represent periodic aggregation of several groups. At most sites, no spatial resolution or specific tool clusters are noted. Reuse of particular localities as indicated by resharpening or reuse of tools is limited.

Mobility Strategies

The large number of sites located close together within a small area with evidence of reoccupation and high occupational intensity and high artefact density could point to a moderate degree of mobility with territoriality. Causes for abandoning are unclear. However, at Attrambakkam and Aryathur, a sterile layer of clayey-silt indicates a break in occupation and possibly represents a palaeo-pond situation formed during the Late Pleistocene period (Rajaguru, personal communication).

Subsistence Strategies

Artefact types tend to indicate both generalized and specialized strategies. The presence of specialized tools like blades, points and Levallois flakes may be considered to represent a strategy aimed at risk reduction and energy conservation with prey being either unreliable or to be exploited within a short span of time. If this is the case then, sites like Gunipalayam, Attrambakkam, Aryathur and Placepalayam may reflect such strategies. Tool types at sites lying close to raw material sources tend to reflect relatively generalized strategies while those in the lowlands reflect relatively specialized strategies. This could once again be related to the distribution of large and small games.

One possible pattern emerging is seasonal aggregation and dispersal towards and away from the river and local ponds

at Attrambakkam and Aryathur. Wet season dispersion from these sites and other low-lying areas close to river towards the hills is indicated. Reoccupation of sites over vast time periods as seen at all sites within the region could imply stability in resource structure.

CONCLUSION

This study focused on the ways in which past man-land relationships could be looked at for understanding the Palaeolithic archaeological record. A regional approach was adopted, sites were plotted and a study of Quaternary environments was conducted. Studies of site taphonomy and post-depositional processes helped to isolate assemblage variability created by natural processes. Following a study of lithic technology, some general principles related to subsistence and settlement strategies of modern foragers were considered; their archaeological correlates were examined, and some general ideas on past man-land relationships were proposed. In general, no comparison with patterns emerging from a study of modern foragers was noted. While this may be the result of the structure of archaeological record and sampling bias, it may also reflect alternate behavioural strategies of the Late Pleistocene hominids.

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