INTERNATIONAL JOURNAL OF
SCIENCE ARTS AND COMMERCE

SPACE UTILIZATION, SITE PATTERNING AND RESOURCE EXPLOITATION AMONG PREHISTORIC PASTORAL GROUPS OF THE NAKURU- NAIVASHA BASIN IN THE LATE STONE AGE PERIOD

By Ben N. Nyanchoga

Abstract

The concept of space in archaeology has caught the attention of scholars interested in spatial attributes of sites. Exactly how much space prehistoric people needed for their activities is a question yet to be answered. As it were, space in prehistoric settlements defined site patterning and resource exploitation. The amount of space required depended on the nature of activities that the people were involved in. Generally, prehistoric people exploited more of horizontal space than vertical space. Exploitation of horizontal space came as a result of procurement of environmental resources for subsistence use. It also arose as a result of other social activities such building of sheltering and ceremonial structures. This paper looks at space needs and site

patterning by prehistoric pastoral groups during the Late Stone Age period in selected sites of the Nakuru –Naivasha basin of the Central Rift Valley of Kenya.

Key words: Geo-archaeology, microliths, occupational floors, horizontal space, vertical space, Resource exploitation, site patterning

Background

In understanding the spatial nature of the sites in relation to environmental resources, the location model developed by Alfred Weber, a German economist, can be used to illustrate the concept. Alfred Weber's (1909) theory of location of industries had become the standard treatise on many aspects of industrial location. Weber's theory is a general theory in that it can be applied to all politico-economic systems. He was interested in identifying those forces which operate as economic causes of location represented in each case by savings in cost as a result of producing in one place rather than in the other .These forces are called location factors.

Weber also gave classification of raw materials as ubiquitous and localized that can be applied with precision to this subject matter. Ubiquitous raw materials are universally distributed and, therefore, always have a transportation cost of zero. On the other hand localized raw materials are found only at specific locations. Transportation costs for localized raw materials are a function of the distance they must be moved. Weberian theory was later developed and used by Walter Isard (1955). In his contribution to transportation costs, Isard (1955) argued that in the case of two sources of raw materials, sourcing would be done from a point that is near the location of industries. Weber's and Izard's arguments can be used to explain the location of the sites in relation to raw materials for the manufacture of tools.

Introduction

Space, site patterning and resource exploitation can be understood within the broad realm of geo-archaeology. Geo-archaeology is a term used to connote the many site formation processes which can be cultural or non-cultural. Cultural processes emanate from activities of humans while non-cultural results from natural agencies.

In this study, the use of space by prehistoric communities of the Central Rift can be understood from three perspectives. There is the use of space at: (a) micro-scale level within structures, for example, shelters, rooms, and graves; (b) semi-micro-scale level within sites, for example, domestic settlements, ceremonial places, and temporary camp locations; and (c) the macro-scale level between major sites, for example, large-scale archaeological distributions within integrated site systems or dispersed across landscapes (Clarke, 1977:11-15) .

Micro- scale analysis looked at intra-structural activity patterning. The amount of space required depended on the nature of activities carried out by prehistoric people. Many prehistoric sites in the Central Rift are located in strategic areas of resource exploitation among other determinants like well drained soils, raised grounds where the people would command a good view of the surrounding areas, and so on.

Space utilization among Pastoral Neolithic communities in the study area has emerged as a critical factor that influenced the layout of structures on the landscape. This eventually led to a mosaic of archaeological features that were placed conveniently on the landscape in relation to environmental resources that were of interest to prehistoric communities.

Spatial organization of sites and Resource exploitation

Hyrax Hill Prehistoric site

Hyrax Hill Prehistoric site presents an array of sites which paint a picture of space needs and resource exploitation by prehistoric people. The summit of the Hill towers behind the sites and it may have been used as a watching spot against raiders or a resting place where people viewed the surrounding plains to the East and West of the Hill and Lake Nakuru to the South. In terms of understanding space needs by prehistoric pastoral groups in the area reference has been made to a number of noticeable features. The most preponderant of all the features are the occupational floors. Table 1.1 shows the GIS readings of the characteristic features of the site.

Table1.1 GIS readings from Hyrax Hill site

Location	**Description**	**GIS readings**
Point A	Summit of Hill	E: 0177524 N: 9969062 H: 1917m
Point B	Neolithic cemetery	E: 0177594 N: 9968979 H: 1871m
Point C	Occupation floor 1	E: 0177611 N: 9968053 H: 1869m
Point D	Occupation floor 2	E: 0177601 N: 9968945 H: 1869 m

Plate1.1: Occupational floors at Hyrax Hill

An investigation of these features give some social and economic implications. Space is an important requirement for human activities. The circular occupation floors at Hyrax Hill look small perhaps accommodating up to a maximum of 10 persons. The space provided by these structures indicated intimate relationships. This could have been necessary when people were engaged in talk or exchange of information, food sharing, ceremonial practices, shelter, and so on (Nyanchoga, 2012).

Different structures within a given spatial location may have had a social connection. Burials may be located close to the units of residence or shelter. This, however, differs across groups or societies. The social implication of this is that the burial belonged to a close family member of the occupants hence close connectivity of the features. The vertical dimension of a settlement site was something out of the ordinary in prehistoric times. Movement in this direction was loaded with symbolic significance. It was especially so with the sites investigated when the ground was broken by digging graves or burials when unusually some structures were built above the ground level like mounds.

Volcanic rocks were used as walls of occupational structures by the site's inhabitants. From observation the height of the walling was not more than 0.914m. This raises the question as to whether the roundish stony structures were actually living floors or ceremonial features. Sheltering features are expected to have been built in such a way that they could offer people protection against wind, rain, scotching sun, attack by wild animals, enemies, and so on. Assuming they were occupational or living floors, then the stones may have been used to hold or give reinforcement to the poles. Twigs of plants may have been used to make the roofing.
Measurements taken during fieldwork revealed that the bigger one was 3.65m in diameter while the smaller one had a diameter of 2.43m. The occupational floors are situated at the foot of the Hill on a well drained and fairly level ground suitable for location of settlements. Perhaps this is because open sites are popular for settlement locations.

At the Hyrax Hill site the entrances to the features face the same direction (East), and there is no evidence to show that they were partitioned internally. Their close proximity implies that the occupants may have been closely related, perhaps members of the same family. Behind these features and about 15 metres away is the Neolithic burial. The burial's closeness to the occupational floors suggests that it had some social connection with them (Sutton, 1973).

The Neolithic burial is within the same spatial location as the occupational units.

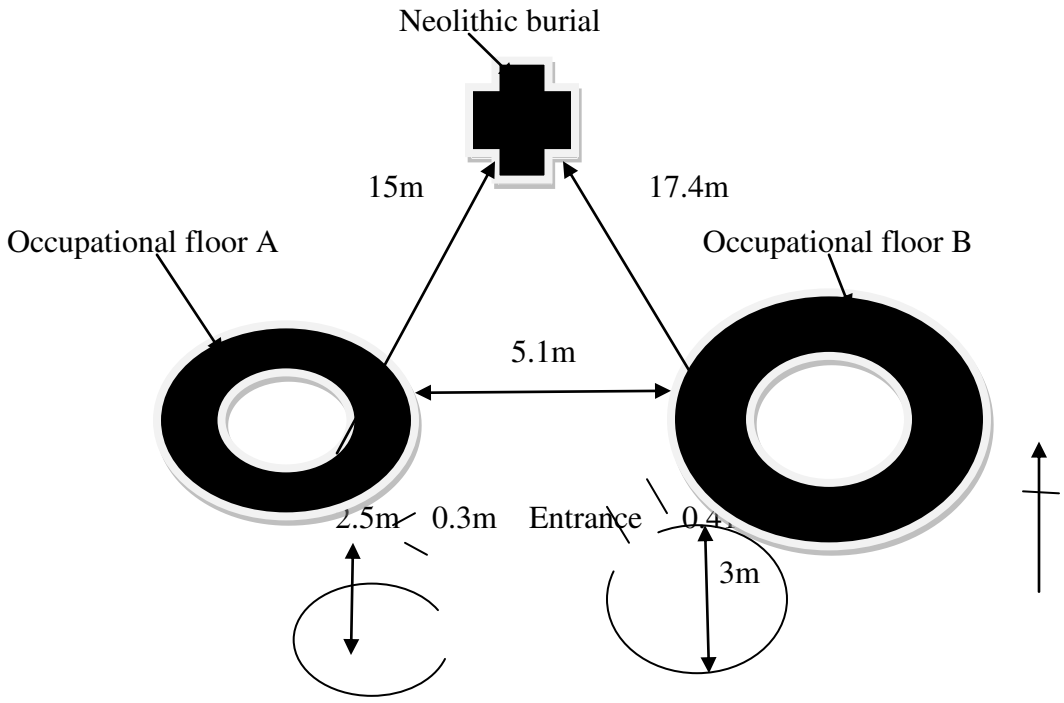

Fig. 1.1: Sketch drawing of the spatial relationships between occupational floors

Figure 1.1 shows spatial interconnectivity between three main features. The two circular occupational floors are of different dimensions and are both connected to the Neolithic burial nearby. Occupational floor A is smaller than occupational floor B. Its diameter is approximately 2.5m while the bigger one measures approximately 3m in diameter. Both have entrances. The smaller one measures 0.3m while the bigger one measures 0.41m. The distance between the two is 5.1m which indicates relative closeness to each other. The two occupational units are at an almost equal distance from the Neolithic burial. The spatial interconnectivity of these features sets a social picture of closely related persons who occupied them. This social scenario can be supported by the results of a study conducted on site structure, kinship and sharing in Aboriginal Australia. Gargett and Hayden (1991) concluded that for all households related by primary genealogical relationships there is a high likelihood that they will be closely spaced. Primary kinship ties have more of an impact on socio-economic relationships and the structure of the sites.

Crescent Island Prehistoric Site

Crescent Island sites are open air sites located adjacent to Lake Naivasha. Table 1.2 gives the GIS readings of the sites showing the correct location of the features. Though not clearly identifiable, the sites are represented by a surface scatter of obsidian flakes and backfilled trenches. This open site may have been preferred by prehistoric pastoralists as it is surrounded by a major fresh water lake, i.e, Lake Naivasha. Table 1.2 shows GIS readings from Crescent Island sites.

Table 1.2 GIS readings from Crescent Island site

Point A	Backfilled trench 1	E: 0210915 N: 9914821 H: 1922m
Point B	Backfilled trench 2	E: 0210719 N: 9914980 H: 1923m
Point C	Survey beacon	E: 0210946 N: 9914774 H: 1922m

There are two main Crescent Island sites both of them located on raised ground above the shoreline. One of the sites is 27m from the margin while the other is 34m. These sites are marked by backfilled trenches and numerous scatters of obsidian flakes. The high percentage of the flakes at the sites indicates that the microliths were extensively used. The distance of the sites from the shoreline suggests that their location of the sites was chosen with utmost care for fear of attacks from aquatic animals like crocodiles and hippos.

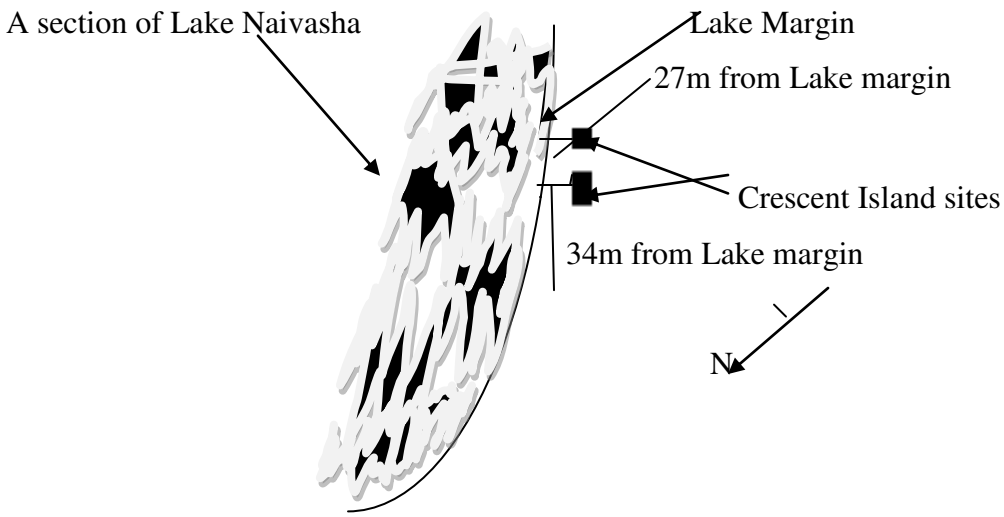

Fig. 1.2: Sketch drawing of the spatial location of the Crescent Island sites

It is relatively difficult to determine the amount of space utilized by prehistoric groups in open sites like the Crescent Island. Space utilization at this site must have depended on the nature of the activities that people were engaged in. A section of the site provided evidence of stone working together with the remains of domestic as well as wild animals. Use of space here was restricted to tool knapping and butchering of animals. Most of the animals hunted in the vicinity were butchered at this location because of the association of tools and bones of animals. At the time of prehistoric occupation, Crescent Island was either fully or substantially surrounded by water. It is by deliberate move that the prehistoric pastoralists chose the site for habitation due to its close proximity to the water resource.

Discussion

Generally, resource exploitation in relation to settlement location can be equated to the model developed by Foley (1981). Settlements were cost-effectively placed closer to basic resources to avoid travelling to long distances in search of the same (see Figure 1.3). Relative distance is measured in terms of cost, time, and/or effort.

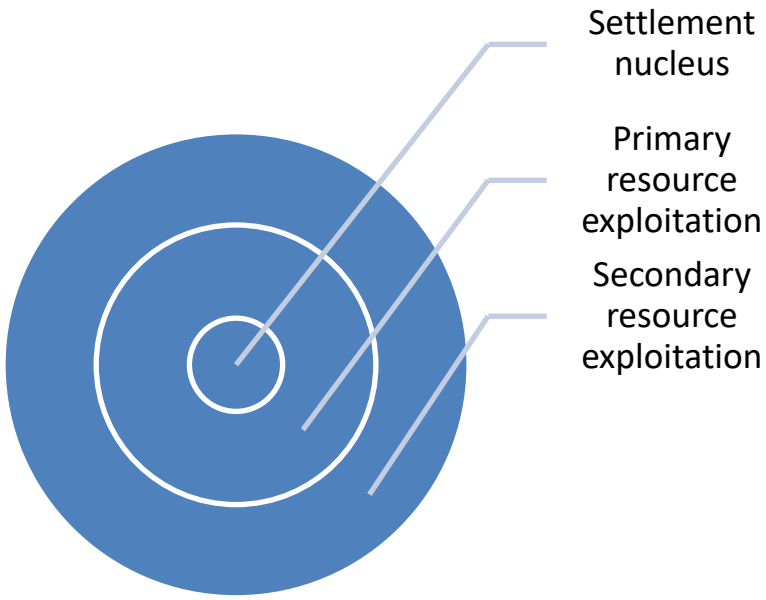

Fig. 1.3: A sketch drawing of an ideal settlement location in relation to resource exploitation

Though space is important, not all points in space are of equal value. It does not matter whether the perspective is economic, social, religious, cognitive or environmental (Butzer, 1978). In particular environmental space is complex and heterogeneous, with the factors of climate, topography, soils, hydrology, vegetation and animal communities. In the Central Rift where the research was done each of these elements played a significant role in understanding patterns of behaviour among pastoral communities. Due to resource variability and distribution on the landscape, there is no clustering in sites.

Generally, economic events determined the location of the sites in many ways. These events include production, consumption and probably exchange. These three elements determined the spatial arrangement of sites in relation to resource acquisition. The factor of connectivity arises between the sites at micro- and macro-levels pegged on resource distribution. On a larger plane

these sites are defined by a series of distances and directions which ultimately define the shape and size of the sites.

The sites under study give a general picture of location determined by an array of environmental parameters. From resource exploitation, secure grounds from enemy attacks, social factors to well drained soils for habitation, convenience in terms of settlement locations is a key factor.

A raw material like obsidian that was preferred for flake tools was sourced from Mt. Eburru about 50KM from Hyrax Hill and 20KM from Crescent Island . All the sites investigated yielded stone tools made from obsidian, the nearest and convenient source of which was Mt. Eburru. Merrick and Brown (1984:133) contend that 54 localities were possible sources of obsidian in the Central Rift. However, they indicate that in the Central Rift obsidian was sourced from within a 50km radius, an assertion that has been supported by Bunney (1985). Merrick et al. (1990:181) argue that many of the Southwestern Kenya sites and Ngamuriak region have their obsidian from the Central Rift sources. They also indicate that there is a marked dominance of Mt. Eburru obsidians in many Elmenteitan sites. The scholars also indicate that obsidian may have been transported far beyond the Central Rift especially during the Late Stone Age period and this is well demonstrated with the advent of Pastoral Neolithic and/or agriculture.

Water sources were also localized and the location of the sites seem to have been conveniently situated near this resource. On the other hand ubiquitous raw materials (resources) would imply pasturelands. Pasturelands were certainly available in the vicinity and did not require much effort looking for them.

In analyzing space needs by prehistoric people two aspects are considered: micro-scale ,semi-microscale and macro-scale site level

At the microscale site level the focus of attention is on division of space within structures e.g rooms. How big are the rooms and structures is well understood at the micro-scale level. Semi-microscale level deals with intra-site patterning. The main issue of consideration here is that within a larger site, there are other small sites or activity areas. Hyrax Hill particularly gives a vivid example of intra- site patterning. Socially, the occupational floors and burials can be construed to indicate the main residential unit, the Hill fort could double as a point for spending leisure time and a security check point.

Macro-scale space use relates to inter-site patterning and horizontal networks. The focus here is on the larger Central Rift sites under investigation. The sites appear purposely and conveniently situated in different regions within the Central Rift .They are interlinked with diversified resource spaces; organized around one or higher order nodes related to defensive, economic, administrative, and ceremonial functions. The settlement sites in general, primarily reflect access and distance to water, pastoral resources, and so on.

Conclusion

A number of factors emerge that collectively determined the forms and processes of Pastoral Neolithic settlements at medium and large scale levels in the area of study. The nature and spatio-temporal distribution of economic resources affect the location of a settlement and the disposition of its resource space within the constraints of the socio-economic subsystem and a complex array of large-scale regional interactive factors. These factors are the topographic matrix, which defines which lands are potentially suitable for pasturage, lands with gentle gradients, water supplies, and so on. The soil matrix is another factor which influences variability of soils which in turn affects opportunities and limitations for grazing, proximity which is related to settlement areas and resource spaces .These factors have influenced at different magnitudes, the location of the sites investigated. Environmental and social factors like security determined the situational aspects of the sites. Security considerations affect the degree of settlement nucleation and the shapes of individual settlements.

Resource variability in space is critical for site location as it influences the trajectory of land developments as well as the emerging patterns of land use. But these resources do not subsequently become ‘constants’ of the human ecosystem. Instead, resources behave as biophysical processes that continue to interact with the human subsystem responding in complex ways to manipulation and extractions. Different components of the soilscape also respond differently to wet and dry periods with continuing repercussions on herds. This affects land use configurations and socio-economic strategies. The environment of the Rift Valley and specifically the Central Rift was in a continuous state of fluctuation. There were wet phases believed to have been favourable to the herders and dry phases when environmental resources

upon which herders depended dwindled. In other words, the interplay between pastoral communities and their resources is as dynamic and indefinite as that of hunter gatherers.

In most cases, settlements will be located near primary resources like water, pasture and food for human consumption. Secondary resources like tools, trading and exchange centers may be exploited from a distant location.

In general, the socio-economic subsystem of each community comprises an array of internal capacities and constraints critical for sustained or intensified resource exploitation. Several dietary, procurement and maintenance variables determine the internal structure of settlements and their associated resource spaces. Socio-economic organization, subsistence and settlements are in turn influenced by a wide range of symbolic and aesthetic values, needs and social stimuli. This affects most realms of activities through ideological interpretation, resource perception, environmental attitudes, and so on (cf. Cohen, 1976).

Spatial analysis provides tools and perspectives with which to examine prehistoric settlement distributions and clustering. Clustering of archaeological sites may result from a variety of different causes. One of these is the localization of resources like water, pasture, building materials, secure place, and so on. Among the aspects examined in this research include space and socio- economic activities. The main concern had to do with the location and flow patterns of people, their herds and associated cultural practices.

References

Bunney, S. 1985. Ancient Trade Routes for Obsidian. *New Scientist* 18:56-62

Butzer, K.W. 1978. Cultural perspectives on Geographical Space. In *Dimensions of Human Geography,* edited by K.W. Butzer,. Research paper 186, Department of Geography, University of Chicago.

Clarke, D.L. 1977. *Spatial Archaeology*. New York: Academic Press.

Cohen, E. 1976. "Environmental Orientations: A Multidimensional Approach to Social Ecology.'' *Current Anthropology* 17: 49-70.

Foley, R.A. 1978. Incorporating Sampling into initial Research Designs: Some Aspects of Spatial Archaeology. In J. Cherry , C. Gamble and S. Shennan (Eds.). *Sampling in Contemporary British Archaeology*. BAR British Series, 50: 49-65.

Gargett, R. and B. Hayden. 1991. Site Structure, Kinship and Sharing in Aboriginal Australia. In E.M.

Isard, W. 1955. *Location Factors in the Petrochemical Industry.* Washington D.C.: U.S. Department of Commerce.

Merrick, H.V., F.H. Brown and M. Connelly 1990. Sources of the Obsidian at Ngamuriak and other South-western Kenyan Sites. In Peter Robertshaw (Ed.). *Early Pastoralists of South-Western Kenya*. Memoir 11, British Institute in Eastern Africa (BIEA).

Merrick, H.V. and F.H. Brown 1984. Obsidian Sources and Patterns of Source Utilization in Kenya and Northern Tanzania: Some Initial Findings. *African Archaeological Review,* 3(1): 129-152.

Nyanchoga, B. N. 2012. *Pastoral Neolithic Settlement Behaviour in the Central Rift Valley of Kenya.* Unpublished PhD Thesis, University of Nairobi.

Sutton, J.E.G 1973. *The Archaeology of the Western Highlands of Kenya*. Memoir No.3 of The British Institute in Eastern Africa.

Weber, A. 1909. *Theory of Location of Industries*, Chicago: University of Chicago Press.