

THE NEOLITHIC OF THE  
MIDDLE NILE REGION  
AN ARCHEOLOGY OF CENTRAL SUDAN AND NUBIA

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# Foreword

Knowledge of past societies, humans' life and resource utilization is of the utmost importance in order to understand the present society. It is therefore with pride that the Nile Basin Research Programme welcomes this book by Dr. Azhari Mustafa Sadig which we see as an important contribution to the growing literature on the River Nile. Dr. Sadig is an archaeologist at the University of Khartoum and was a member of the Nile Basin research group on "Water, Culture and Identity" that spent six months at the University of Bergen in 2008. The group consisted of researchers from Sudan, Tanzania, Rwanda and DR Congo. The Nile Basin Research Programme began in March 2006. It is based at the University of Bergen and is funded by the Norwegian Ministry of Foreign Affairs. The programme is devised as a guest researcher programme for researchers from the Nile Basin Countries. A new research theme is announced for each semester and one researcher from each of the Nile Basin countries is given the opportunity to join a group of guest researchers. The aim of the programme is to create a place for independent research, away from everyday duties and commitments. Each group is led by an academic coordinator closely connected with a strong research group at the University of Bergen. The "Water, Culture and Identity" group was led by Dr. Terje Oestigard, Uni Global, University of Bergen.

The archaeological investigation into Neolithic societies cast new light on how people interacted with, and depended upon, the River Nile. By acquiring ever more knowledge about these past societies we gain an understanding of human development in the area over the last thousands of years. This gives us ultimately a better basis to understand current challenges and possibly also solutions.

The Nile Basin Research Programme wishes to thank Dr. Sadig for his tireless work on the manuscript while in Bergen as well as anonymous referees for giving of their time to read the manuscript. We would also like to thank Professor Randi Haaland at the University of Bergen for commenting on the draft manuscript. Fountain Publishers in Kampala is thanked for the efficient editing and publishing of the book.

**Dr Tore Saetersdal,**

Director, Nile Basin Research Programme

Bergen, February 26, 2010



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None of the people named above bears any responsibility for the opinions expressed in this book or for its shortcomings. Finally, I have benefited greatly from the friendship and endless conversations with Professor Randi Haaland (University of Bergen).

# Introduction

The Sudan is the largest country in Africa, extending across 2,000,000 sq mi (5,000,000 sq km). It extends between the southern limits of the Sahara and Libyan deserts and the northern limits of the equatorial rainforests. It also extends from the western coast more than 3,500 mi (5,500 km) to the mountains of Ethiopia and the Red Sea. The Sahel comprises the northern reaches. It borders on Egypt in the north, on the Red Sea in the northeast, on Eritrea and Ethiopia in the east, on Kenya, Uganda, and Congo (Kinshasa) in the south, on the Central African Republic and Chad in the west, and on Libya in the northwest. The main geographical feature of Sudan is the Nile River, which with its tributaries (including the Atbara, Blue Nile, and White Nile rivers) traverses the country from south to north. The Nile system provides irrigation for strips of agricultural settlement for much of its course in Sudan and also for the Gazeira plain, situated between the White Nile and the Blue Nile, just south of their confluence at Khartoum. In the extreme north, the Nile broadens into Lake Nasser, formed by the Aswan High Dam in Egypt. Much of the rest of the country is made up of an undulating plateau (1,000-2,000 ft/305-610 m high), which rises to higher levels in the mountains located in the northeast near the Red Sea, as well as in the Central, western, and extreme southern portions of the country. The highest point in Sudan is Kinyeti (10,456 ft/3,187 m), in the southeast. Rainfall diminishes from south to north in Sudan; thus, the south is characterised by swampland (the Sudd region) and woodland, the center by savanna and grassland, and the north by desert and semi-desert.

Archaeological evidence has confirmed that the Sudan was inhabited at least since Paleolithic Age. Among the oldest examples of these evidences to be mentioned are those found at Khor Abu Anga, near Khartoum and in other Nubian sites in the area of Wadi Halfa, Sai and around Korti. The Sudan was also a land of major human actions during the Holocene, where evidences prove the existence of an earlier settled way of life along the Nile and its old tributaries (including Wadi Hawar, Wadi Muqaddam and Wadi Howar). Since Arkell's excavations at the major Holocene sites at Khartoum and Shaheinab, completed by the end of the 1940s (Arkell 1949, 1953), the International understanding of these evidences has increased and improved enormously during the past forty years. After the end of the Aswan High Dam campaign, large-scale excavations have been carried out along the Middle Nile Region. This second phase of investigation has resulted in the recovery of a large body of data and a substantial quantity of material. This phase of research has provided broad confirmation of the framework established

by Arkell and has greatly added to it, although there are still a number of hiatuses in the established cultural sequence.

These excavations have also greatly increased our knowledge of the cultural development of the Neolithic period, together with the results of the previous work in Nubia and Central Sudan. Yet, there are still some questions regarding the interpretations of its cultural historical significance. This book attempts to trace these questions and try to find answers to some of them. For example, the development of pastoralism in this region is one of the basic research problems still facing scholars. More traditionally oriented theories hold that the occurrence of the Neolithic domestic animals in the Sudan was the result of the influx of the pastoral populations from the Middle Holocene Sahara which at that time was drying out. The important question here is from where and by whom were domesticated animals introduced to the Nile? How did this happen? What was the pastoral Neolithic like - did it vary between regions? Did hunter-gatherers become pastoralists or were they driven away by new people migrating in? The study of Neolithic "settlement patterns" is another major concern of the Neolithic archaeologist in the Middle Nile Region. This is difficult as we have very few sites. Firstly, can we show that sites are different in function from each other through the material found on them? Secondly, why do we have no demonstrably permanent settlement sites during the Neolithic period? We assume they were all eroded through deflation, but did they exist, bearing in mind that Arkell found the surviving remains of a Mesolithic settlement at Khartoum?.

Regardless of specific aspects, many Middle Nile Region Neolithic groups share basic characteristics, such as living in small-scale, presumably family-based communities, subsisting on domestic animals supplemented with the collection of wild plant foods and with hunting, and producing hand-made pottery. The first question here is the direction of the spread of these characteristics over the Middle Nile Region landscape and the relations between the different cultural areas and sites within these areas. The second question is, can we identify homogeneity of the "cultural" groups who inhabited the large area of the Middle Nile Region. If so, in what ways?

Stress has long been put on the need for archaeological research to be undertaken in order to solve these problems, but a new approach is needed to investigate the remaining major questions set out above, which deals with the available evidence at an appropriate scale. Such an approach is the 'intra-regional approach' which has not, so far, been used as a basis for answering such questions. In this book, therefore, the economy, subsistence, and settlement patterns of the Neolithic of Middle Nile Region will be investigated through an intra-regional approach because, based on the study of the most relevant discoveries in this region, the assumption that we are dealing with a homogeneous cultural

zone can be tested through the intra-regional approach, and through a reassessment of the cultural development of the region.

The book also examines the similarities and differences in major characteristics of the different sites in the Middle Nile Region. This will include the intra-regional relations between different sites during the Neolithic. The similarities, differences and the process of culture through time will be explored.

Studies of prehistoric Sudan, of the type outlined above, conducted by Sudanese archaeologists, ceased from the early eighties, and consequently no further material has been analyzed. Thus, this book will be a long-awaited Sudanese academic achievement, which will revitalize the study of prehistoric archaeology, particularly the Neolithic, by Sudanese researchers. The last scholar to publish any such a publication was Mohammed-Ali (1982). Furthermore, future studies of the Neolithic, the prehistory of Middle Nile Region, and/or human ecologies and landscapes will surely benefit from this book. It is known that research which deals with landscape challenges and adaptations to challenges posed by the landscape are more significant when dealing with different regions, as this allows the generation of more valid general statements about the culture. The comparative perspective used in this book will enable a greater insight to be obtained into the processes occurring during the Neolithic to the challenges posed by the landscape in which they were living, and the ways in which the interaction utilization of riverine and land environments was reflected in those cultures.

The basic objective of this book is to develop earlier studies, in the light of much new data which has been found in the last 40 years in the Middle Nile Region. New data from Northern Sudan (mainly Dongola Reach and Mahas region), White Nile and from the Neolithic site of es-Sour near Meroe will be mentioned as necessary. This will provide a summary and interpretation of the archaeological evidence of the Neolithic of the region through a theoretical and practical approach to subsistence, economy and settlement patterns. It will build upon the previous research on different topics in the Neolithic period, a process which needs to be restarted by directing master's degrees and doctoral students in the Department of Archaeology, Faculty of Arts, University of Khartoum and other universities as well, to carry out research in this period. At the same time, the current book will turn to students or scholars interested in Neolithic, trying to offer an upgrade but necessarily brief framework of knowledge of Neolithic of the Middle Nile Region. It is written for the non-specialist; however it will also be useful for those archaeologists who, whilst interest in Neolithic because they read about it during the course of their study, only have a basic understanding of the major aspects and approaches by which Neolithic is studied.

# 1

## The Land and its Resources: Environmental Background

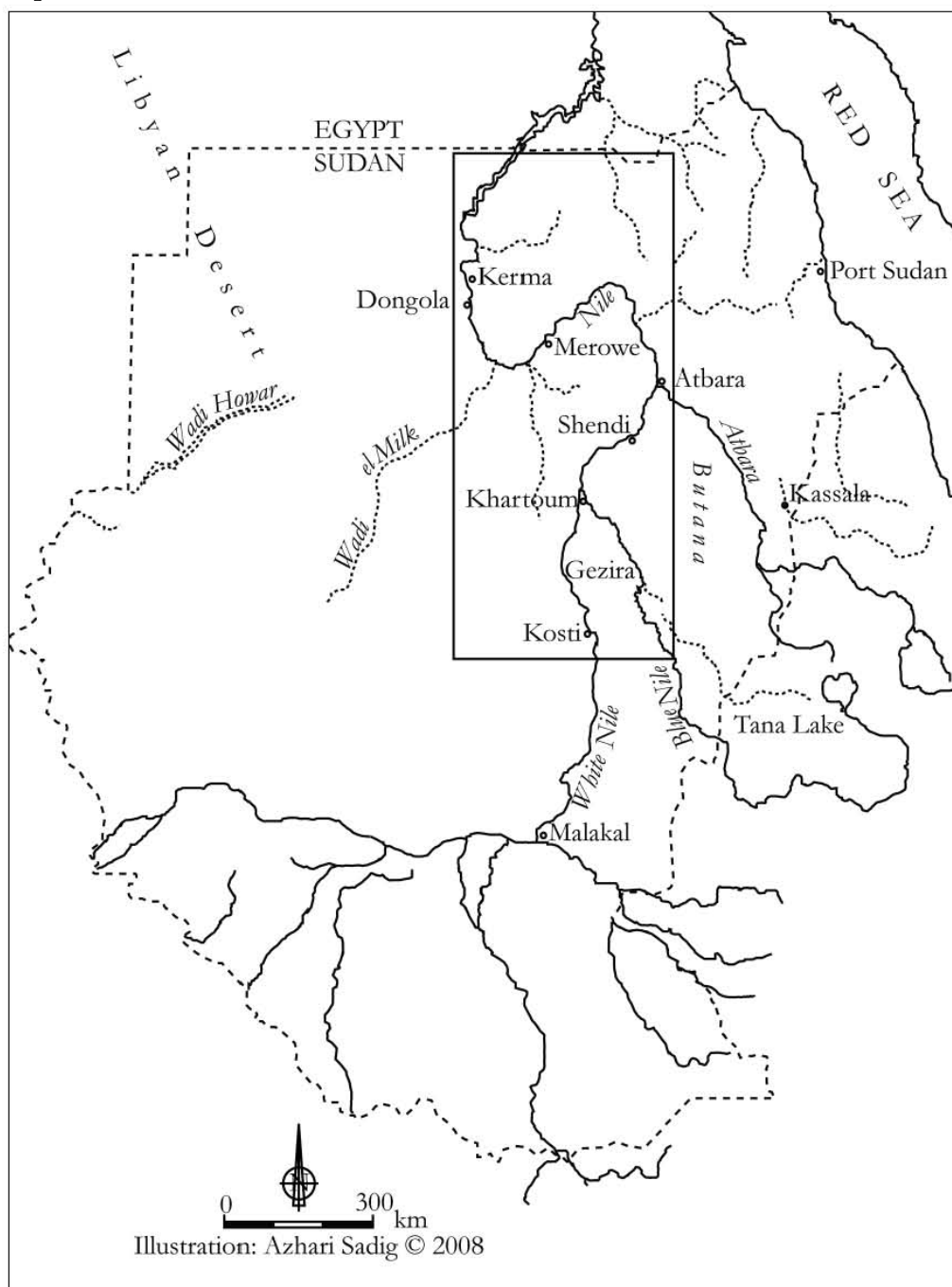
### Topography and Water Resources

The Sudan occupies a major part of the Nile basin but small parts of the country drain into the Chad basin, such as the Wadi Azum and its tributaries, which drain the eastern slopes of Jebel Marra in Darfur (Map 1.1). The Nile and its tributaries are the main rivers of the Sudan. From north to south these rivers include the Atbara river; which joins the Nile near the edge of the desert; the Blue Nile, rising near lake Tana; and its tributaries the Rahad and the Dinder; the White Nile, with its main tributaries the Sobat, Bahr el Jebel and its main tributaries in the Albert and Victoria Niles, Bahr el Arab, Bahr el Ghazal, and Bahr el Zeraf. The Gash descends from Eritrea near Asmara and loses itself in a large desert delta north-west of Kassala (Whiteman. 1971: 1).

There are many desert wadis that flow seasonally, but few of them reach the Nile. The largest of those draining to the Nile are Wadi Howar and Wadi el Milk, both of which were important watercourses during the Pleistocene and Holocene. Located at the southern fringes of the Libyan Desert, Wadi Howar is the largest dry river system in the presently hyper-arid and uninhabitable Eastern Sahara. The wadi is over 1,100 km from its source area in eastern Chad to the Nile. Geo-scientific investigations have shown that, during the early Holocene, this wadi was the Nile's most important tributary from the Sahara. Later, it became a chain of freshwater lakes and marshes supported by local rainfall, until it ultimately became extinct about 2,000 years ago. Once an ecologically favoured area of settlement and a communication route between the inner regions of Africa and the Nile valley, Wadi Howar has abundant prehistoric sites that provide evidence of important population movements and interregional cultural contacts (Richter. 1989: 431-442).

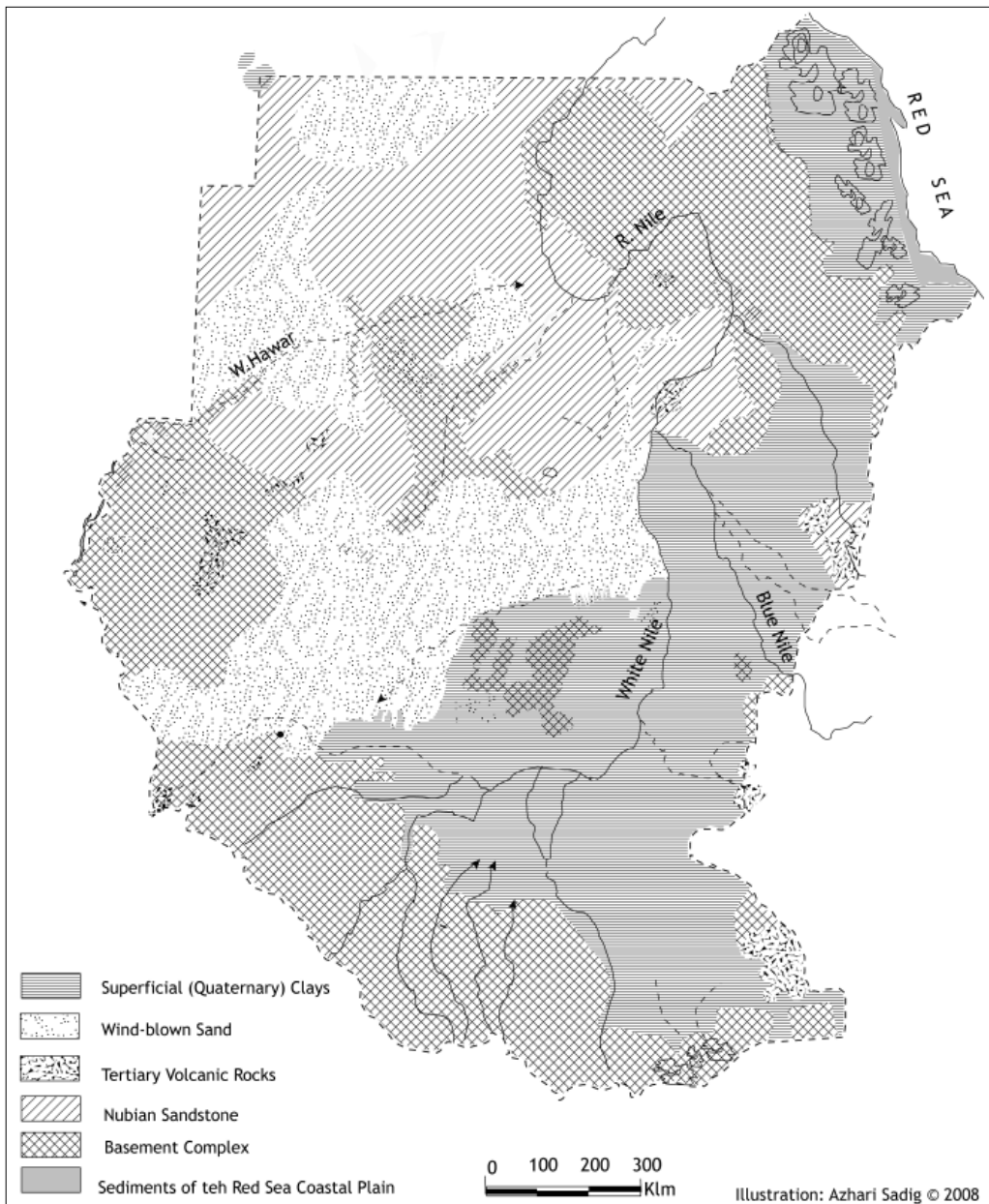
The Nile is the most conspicuous topographic feature in Nubia and Central Sudan. Throughout Nubia, the flow of the river is periodically interrupted by the cataracts that are areas where outcroppings of rock prevent easy water navigation. These cataracts, six in total, are the result of Nubian geology.

**Map 1.1: Sudan Nile Basin and the area of the research**



Two major stone formations underlie the Nubian stretches of the Nile: Nubian sandstone and granite. Where the river passes through the granite formation, the valley is narrow, with sharp cliffs on both sides and little alluvial soil. Where the river flows over sandstone, the valley is broader and generally has a wider alluvial floodplain (Map 1.2).

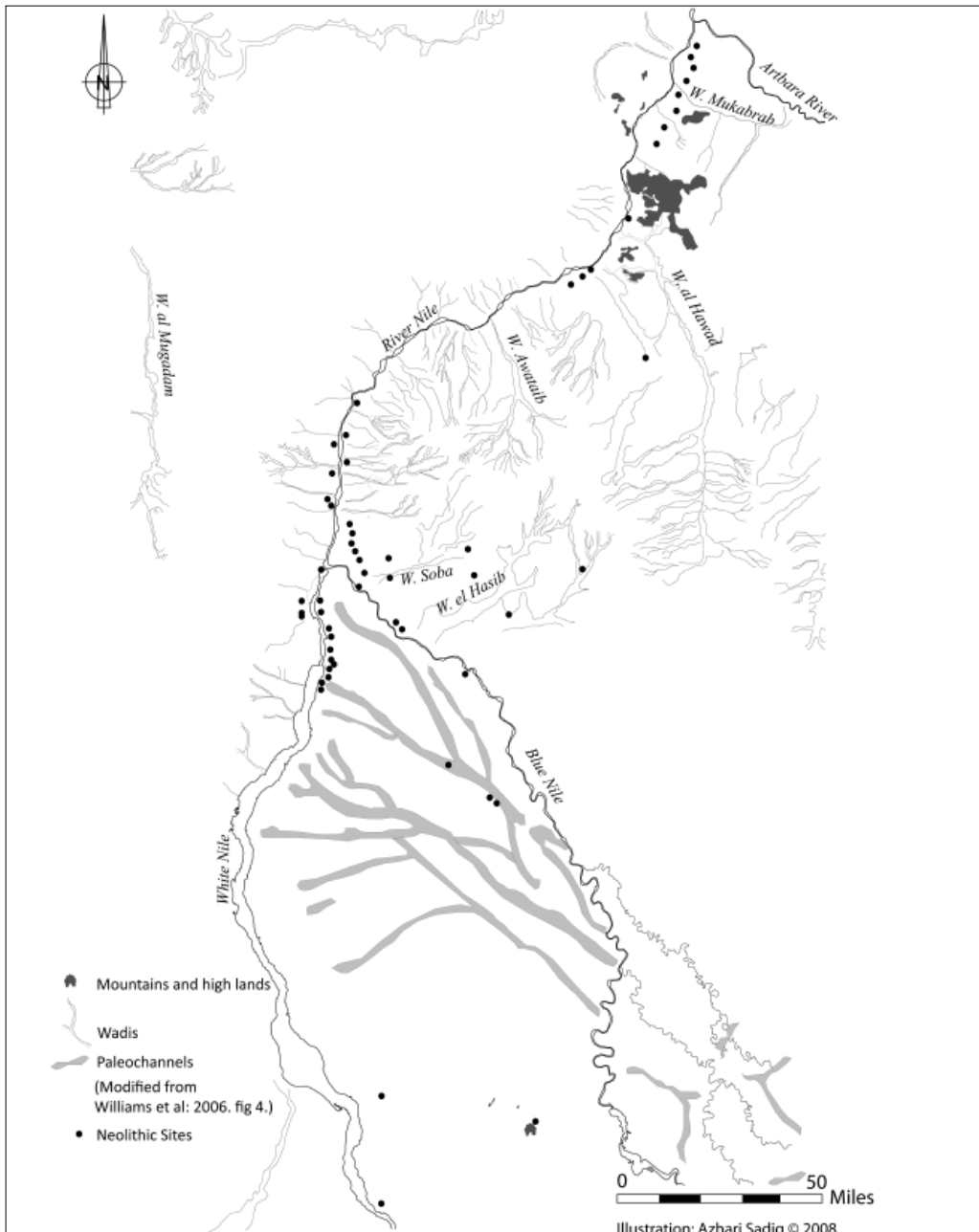
Map 1.2: Sudan: Landforms



Central Sudan, on the other hand, often presents a much harsher environment. The main environmental features characterising the area are the River Nile, its alluvial plain and its terraces, the annual rainfall and the vegetation cover. The Nile determines the demographic concentration of the population along its banks. Most of the later prehistoric sites in this area, especially at the western bank in the Khartoum area, are situated on dissected gravel terrace deposits of the Nile not far from the actual Nile Channel (1.4 km and 0.65 km away).

The west bank at Khartoum is characterised by broad expanses of Nubian sandstone sediment resting on a Precambrian Basement Complex. It is bound by eminent physical features consisting of the river Nile to the east and outcrops of Nubian sandstone formation to the west. Like the eastern bank, several large seasonal wadis and khors bisect the area from west to east (Map 1.3). Whiteman has distinguished three units of geological formation at the western part of the Nile (Whiteman, 1971: 182).

**Map 1.3: Central Sudan: Water system and distribution of Neolithic sites**





These units can be summarised as follows:

- a. The Markhyiat Jebels, which consist mainly of detrital quartz covered by ferricrete sandstone
- b. The pebble-conglomerate, which comprises ferrous oxides and rocks
- c. Mudstone, which consists of silt and/or clay

Three different overlapping topographical units are recognizable in these areas:

- a. The gravel - ridge, which is an old terrace of the Nile. Its breadth it ranges from a few tens of metres to a few hundreds of metres. The surface consists mainly of eroded Nubian sandstone with quartz-pebbles and coarse-grained sand
- b. The alluvial plain, which is situated between the present flow of the river and the gravel ridge, stretching out parallel to these two features with varying widths. The alluvial plain is flat and characterised by its fertile alluvial soil which is renewed annually by new silt deposits, brought in by the river Nile during the flood season
- c. The semi-desert plateau to the west of the gravel - ridge. The topographical formation of this area displays an extensive sandstone plateau stretching westwards to include the area of western Sudan, and extending as far as the Sahara Desert. The surface layer of this area is dominated by sand consisting of well-rounded quartz grains of Nubian sandstone origin, interrupted by gravel-rich strips and some hills.

The sites on the east bank are much further away from alluvial plain with clay and silt deposits. Comparable deposits occur at Kadero I, and Krzyzaniak (1978) has compared these deposits with those of the Gezira Formation south of Khartoum; more precisely the upper fine deposits of the Gezira Formation or the Gezira Clay.

Haaland (1981a: 45-53) refers the deposits of Zakiab and Um Direiwa (eastern bank north of Khartoum) to the Gezira Formation, which forms most of Central Sudan. The most dominant features in this region are the following:

### **The River Nile**

The River Nile is the Central feature in the environment. The Nile flows for 6,700 kilometres through ten countries in north-eastern Africa – Rwanda, Burundi, Zaïre/Congo, Tanzania, Kenya, Uganda, Eritrea, Ethiopia, the Sudan, and Egypt – before reaching the Mediterranean, and is the longest international river system in the world. Its two main tributaries converge at Khartoum: the White Nile, which originates in Burundi and flows through the Equatorial Lakes, provides a small but steady flow that is fed by the eternal snows of the Rwenzori (the “rain giver”) Mountains, while the Blue Nile, which suffers from high seasonal fluctuations, descends from the lofty Ethiopian “water tower” highlands.

The Blue Nile flows out of the Ethiopian highlands to meet the White Nile at Khartoum. The Blue Nile is the smaller of the two; its flow usually accounts for only one-sixth of the total. In August, however, the rains in the Ethiopian highlands swell the Blue Nile until it accounts for 90 percent of the Nile's total flow. Several dams have been constructed to regulate the river's flow the Roseires Dam (Ar Rusayris), about 100 km from the Ethiopian border; the Meina al Mak Dam at Sinjah; and the largest, the forty-metre-high Sennar Dam, constructed in 1925 at Sannar. The Blue Nile's two main tributaries, the Dinder and the Rahad, have headwaters in the Ethiopian highlands and discharge water into the Blue Nile only during the summer high-water season. For the remainder of the year, their flow is reduced to pools in their sandy riverbeds.

The White Nile flows north from Central Africa, draining Lake Victoria and the highland regions of Uganda, Rwanda, and Burundi. At Bor, the great swamp of the Nile, known as Sudd, begins. The river has no well-defined channel here; the water flows slowly through a labyrinth of small spillways and lakes choked with papyrus and reeds. Much water is lost to evaporation. To provide for water transportation through this region and to speed the river's flow so that less water evaporates, Sudan, with French help, began building the Jonglei Canal (also called Junqali Canal) from Bor to a point just upstream from Malakal. However, construction was suspended in 1984 because of security problems caused by the civil war in the south.

South of Khartoum, the British built the Jebel al Auliya Dam in 1937 to store the water of the White Nile for release in the autumn, when the flow from the Blue Nile reduces. However much water from the reservoir has been diverted for irrigation projects in Central Sudan, or water evaporates, so the overall flow released downstream is not great.

The White Nile has several substantial tributaries that drain from southern Sudan. In the southwest, the Bahr al Ghazal drains a basin larger in area than France. Although the drainage area is extensive, evaporation takes most of the water from the slow-moving streams in this region, and the discharge of the Bahr al Ghazal into the White Nile is minimal. In southeast Sudan, the Sobat River drains an area of western Ethiopia and the hills near the Sudan-Uganda border. The Sobat's discharge is considerable; at its confluence with the White Nile just south of Malakal, the Sobat accounts for half the White Nile's water.

Above Khartoum, the Nile flows through desert to empty into Lake Nasser behind the Aswan High Dam in Egypt. The river flows slowly above Khartoum, dropping little in elevation, although five cataracts hinder river transport at times of low water. The Atbara River, flowing out of Ethiopia, is the only tributary north of Khartoum, and its waters reach the Nile for only the six months between July and December. During the rest of the year, the Atbara's bed is dry, except for a few pools and ponds.

### **The alluvial plain**

The plain is deposited by the river in the flood season. It slopes eastwards which allows the river to increase greatly in width in this area during the flood season. According to Caneva (1983a), the ancient alluvial plain of the Nile appears to be highly asymmetrical: much more extensive on east bank of the river than the west bank.

### **The gravel plateau**

The plateau forms the extreme easterly part of the Sahel zone; the Blue Nile and the Atbara delimit the east-west boundaries of this area.

### **The southern part of Central Sudan**

Between the White Nile and the Blue Nile the area is characterised by a gently sloping clayey plain stopped by a few isolated inselberg, like Jebel Tomat. The greater part of the area is characterised by its dark alkaline cracking clays, which were laid under permanent water. The red and brown coloured soils are associated with Jebel Tomat. The sandy loams and clays and recently deposited alluvial sands (*A. Giryf*) are observed along the banks of the White Nile.

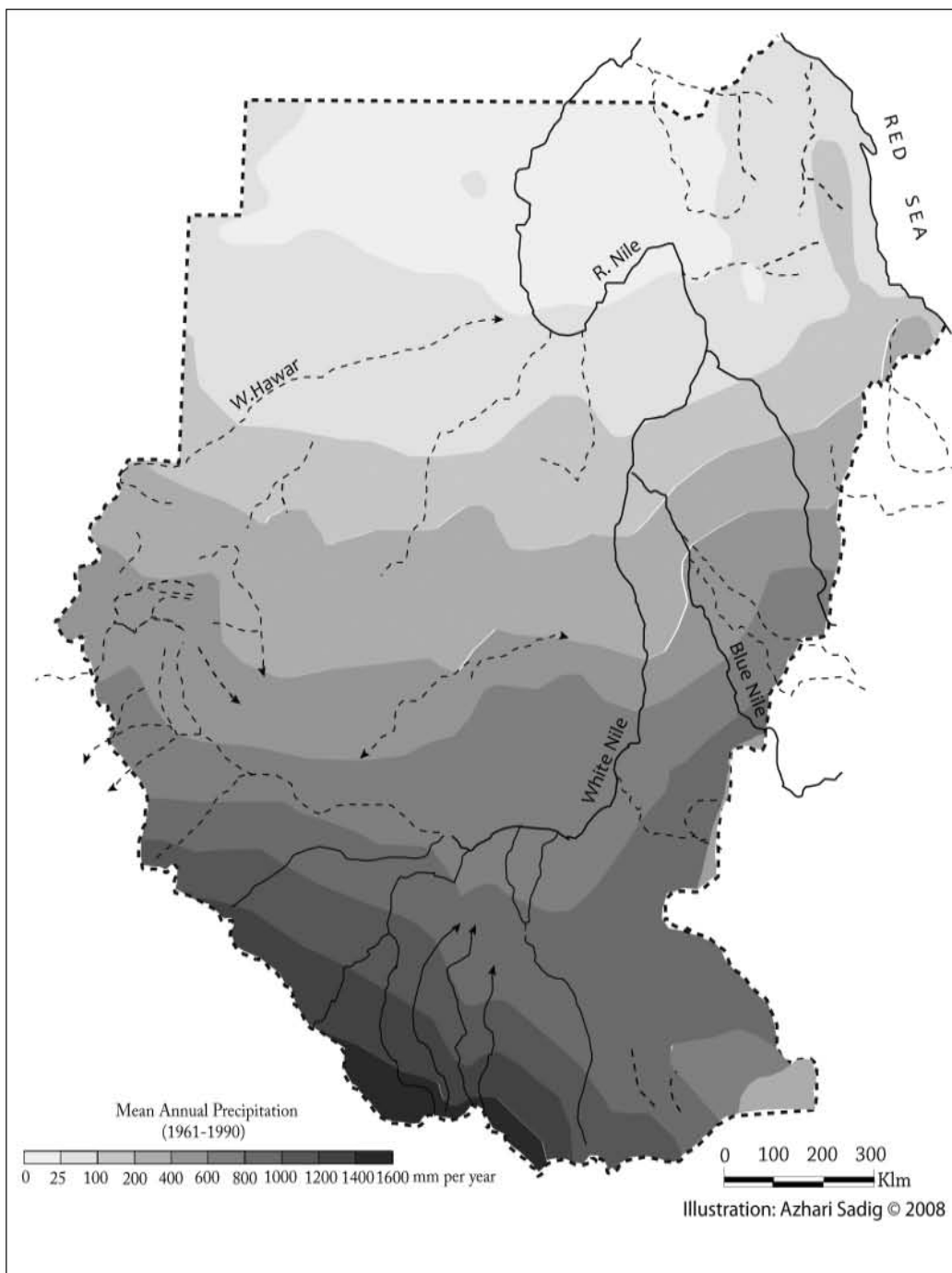
## **Climate**

The modern climate of the Sudan is wholly tropical and varies from complete desert north of c.18° N through regions of semi-desert, with rainfall of varying intensity and duration, passing southwards into a continental equatorial type of climate with a considerable dry season, even in the extreme south (Lebon. 1965). Rainfall is clearly not necessarily seasonal and for much of the country it is related to the position of the intertropical convergence zone and the descending easterly jet stream.

The amount of rainfall increases from the dry north to the humid south (Map 1.4). In very general terms, this variation is caused by the domination of the dry northern and northeastern winds in the north and the humid southwestern winds in the south. The most rain falls on the Imatong Mountains and on the Sudanese-Congo border, which forms the Nile-Congo watershed. From there, rainfall decreases toward the northeast as distance from the Atlantic Ocean increases. Jebel Marra, Nuba Mountains and the Ethiopian foothills receive more rain than the surrounding plains (Noordwijk. 1984: 15).

Central Sudan has a rainy season in July and August. Annual precipitation at Khartoum, where the White and Blue Niles meet, averages about 18cm. The amount of actual precipitation is small, increasing southwards, from 5cm at Dongola to 18cm at Khartoum. Towards the southern part the climate merges into equatorial rainy climate.

**Map 1.4: Sudan: Mean annual rainfall**



Temperatures are high throughout the country, with mean daily winter temperatures of 60.8°F in the north and 84°F in the extreme south. The diurnal range in the desert in the

north is often as much as 40°F. During the summer the highest mean daily temperature at Atbara on the desert edge, is 109°F, while at Wadi Halfa, in the desert, temperatures of 126°F are common. At Khartoum 116°F is frequently experienced in the months preceding the rainy season.

## Present Day Ecology of Central Sudan

Five principal latitudinal ecological zones may be described in the Sudan, and may be correlated with the climatic sequence from north to south (Map 1.5). Important differences occur in the composition of the flora and fauna within each zone (Noordwijk, 1984). Nubia and Central Sudan fall broadly within two major ecological zones; the desert or Saharan zone and semi-desert zone, and savanna. The characteristics of each of these two broad zones are discussed below, with special reference to Third Cataract and Khartoum regions.

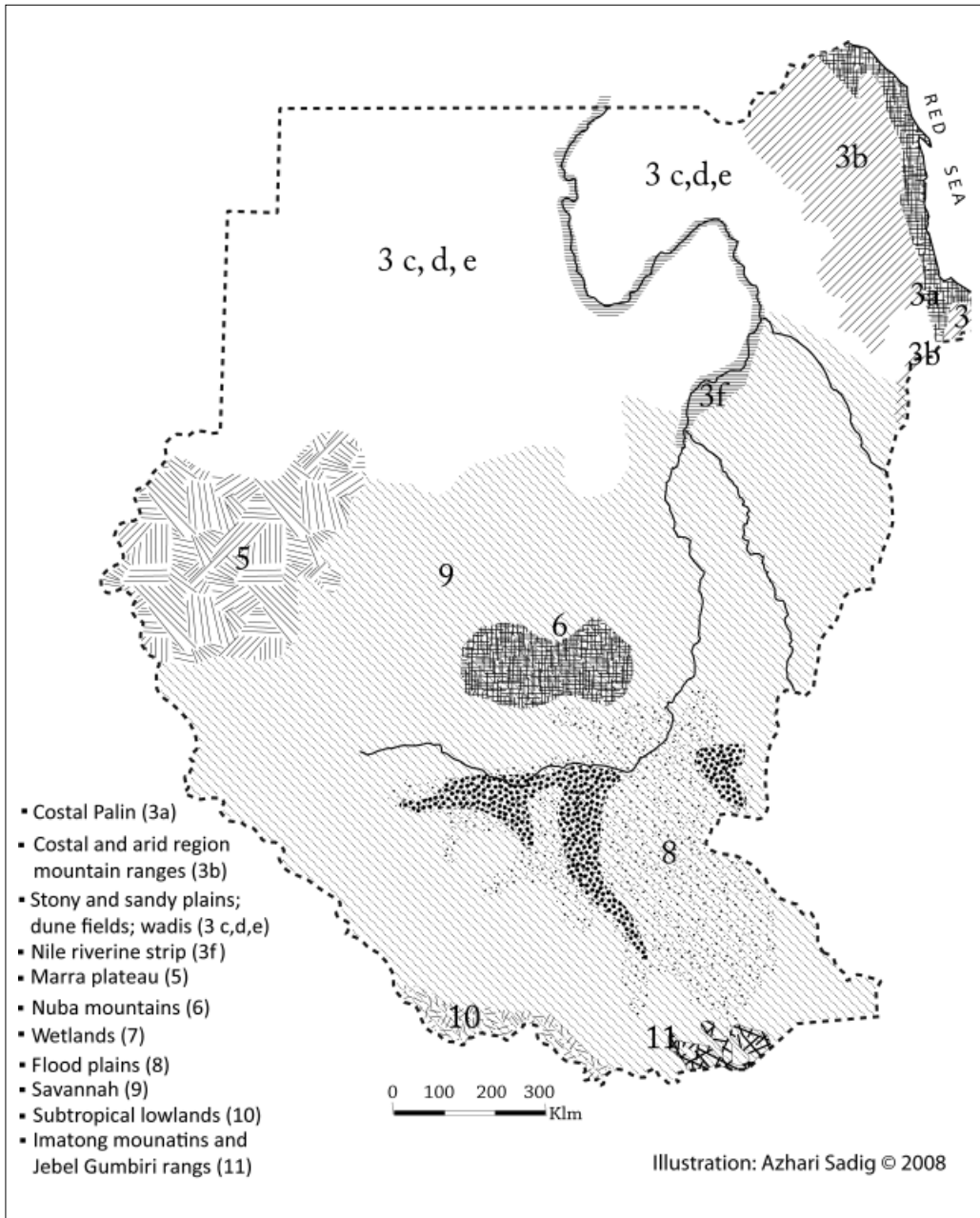
### The Saharan Zone and Semi-desert Zone

Almost all of this region is known for its inhospitable climate, but in spite of that some plants and animals have managed to adapt. The plants here are characterised by specialised biological features which enable them to survive. Besides, the animals spend all the day in underground tunnels and shelters and appear only at night. This feature is described by El-Tom (1981: 32) in the following: “*Animals which live in the Saharan environments have special characteristics and physiological structures that do not differ in animals in other deserts. On this base, the animal species in the desert are divided according to their geographical distribution or to its geographical regions*”

This region receives about 9-30cm of rain/year, and it experiences 11 dry months (Noordwijk, 1984: 32). Some plants are only visible in the rainy season and survive the dry season as seeds (annual plants). After the occasional rains a short-lived grass growth is available. Some woody plants can survive the dry season: *Acacia tortilis* “*Sayal, Samar*”, which also occurs in the desert, forms 2-3 m high shrubs on thin desert soil, together with *Maerua crassifolia* “*Sareb*”, although the latter species seem to have almost disappeared since the 1950s’ (Noordwijk, 1984: 34). On deeper soils or wetter sites *Acacia mellifera* “*Kitr*” and *Commiphora africana* “*Gafal*” are found.

For animals the desert is a harsh environment, with extreme temperatures, little water and little food. Only a few antelope species survive by migrating over large distances to find food all year round. The semi-desert offer greater possibilities for survival for small animals, which hide in the soil or under shrubs during the hottest and driest part of the day, and which often survive the long dry season in some form of resting stage.

**Map 1.5: Sudan: Regional environments**



Lebon (1965) divides this region into two main vegetation zones:

### ***Desert***

The desert includes the area between north of latitude 16° and east of longitude 24° to south of ad-Damer and north of Mohammed Qol. It includes both the Nubian eastern desert and the Libyan Desert. In general, within this zone, as the term itself implies, there

is no vegetation; the only exceptions are to be found in the basin of the Wadi Howar, and, in the Bayuda desert, along the Wadi Muqaddam and in the basin of the Khor Abu Dom, where stunted shrubs have spread from semi-desert and there is sparse growth of ephemeral herbs and grasses after rare showers. In northern Darfur, on the fringe of the desert proper, a sparse, patchy growth of herbs and short grasses appear after seasons in which rain has fallen, but not until the northeast wind begins to blow steadily in October, bringing drier air and cooler nights. This local type of sparse camel pasture is called *Gizū* by Arab camel-herders, who may drive their animals as far as 800km to browse and thrive during the cool season.

### **Semi-Desert Scrub and Grasslands**

This region includes the area south of Tokar to just north of Wad Madani and westwards to ad-Dueim and Fasher. In this zone the vegetation is a varying mixture of grasses and herbs, either without any woody vegetation at all or, more usually, with a variable scatter of scrub bushes up to 2 m high. Rain falls only between late July and mid September.

Although the semi-desert zone covers the greatest part of Central Sudan, some parts of this region have their own characteristics. For example, Harrison and Jackson (1958) classified the vegetation of the Khartoum area as *Acacia tortilis* – *Maerua crassifolia* Desert Scrub. The flat-topped *A. tortilis* is the only feature of the vegetation which is generally constant. It usually appears as an uneven scatter, with a greater concentration of bushes along drainage lines and with higher rainfall, as occurs east of Khartoum, where some fairly thick, even stands occur.

*Maerua crassifolia* has been described as being usually present in considerable amounts. *A. radiana* is abundant locally on sandy drainage lines, and *Capparis decidua* (*Tundub*), *Ziziphus spinna-christi* (*Sider*) and *Balanites aegyptica* (*Heglig*) on clay drainage lines. *A. Nubica* (*And*) and *Calotropis procera* (*Usher*) indicate heavy overgrazing (Harrison and Jackson. 1958: 35).

The narrow strip along the banks of the Blue, White and Main Niles carries riverside vegetation. Acacias, particularly *A. nilotica* (*Sunt*) and *A. Seyal* (*Talb*) are dominant tree species, while *Tamarix* (*Tarfa*) and *Salix spp.* are common riverside shrubs. The area south of Khartoum, between the Blue and White Niles, exhibits three major vegetation units as outlined by Harrison and Jackson (1958) in relation to rainfall; semi-desert scrub, semi-desert grassland on clay and *Acacia mellifera* thorn-land. Actually, the first two units fall within the region of the semi-desert scrub and grasslands.

The semi-desert scrub of the Gezira forms the northern - most parts of the area. The vegetation consists of a varying mixture of grasses and herbs, either without any woody vegetation at all or, more usually, with variable scatters of bushes interspersed with bare areas in the riverine soil. On the other hand, the vegetation of semi-desert grassland on clay consists of *Acacia nilotica* and *A. seyal* in the lower part of the floodplain, with *Ziziphus*

*spina-christi* and *Balanites aegyptiaca* on the higher ground (Obeid *et al.* 1982: 150). Other vegetation includes *Acacia tortilis* (*Sayyal, Samr*), *Capparis decidua*, *Acacia nubica*, *Calotropis procera* (Harrison and Jackson. 1958: 150).

The acacia thorn-land lies south of the line joining Tagra and Wad Medani and it extends southwards to the line joining Kosti, Jebel Moya and Sennar (Harrison and Jackson. 1958: 151). This area consists of a mixture of *Acacia nilotica*, *A. seyal* and *Balanites aegyptiaca* along the river banks, and *A. mellifera*, *A. nubica*, *Capparis decidua* thickets and others on dark cracking clay, alternating with grass areas.

The area north of the Blue Nile and east of the main Nile is situated within the Acacia Scrub vegetation zone (Andrew. 1948: 35). The vegetation cover is generally very scattered and sparse and areas absolutely bare of vegetation is visible during most of the year. However, much of this area provides ground for the growth of the short-living annual grasses. The chief floristic character is acacia but there is a considerable presence of other scrub species as well.

### **Savanna**

The Savana covers the largest area of the Sudan, and forms the most exploited region in the country. This type of savanna is composed of grass with trees, shrubs or bushes, in variable proportions. Grasses usually grow to a height between 30 and 100 cm. Light rainfall and short rainy seasons characterise this region. The dominant genus of trees is the acacia, to the extent of some 35 species, nearly all large shrubs or small trees. Towards the southern margin of this zone, broad-leaved trees and some palms appear, and replace acacia locally; but acacia are never wholly absent. The growing season throughout the low savanna is longer than the semi-desert scrub and grasslands, and sahara zones Rainfall is always sufficient to sustain growth for some weeks.

According to the amount of rainfall and the length of the dry season, three main types of savanna can be distinguished:

- a. Low rainfall woodland (Sahel savanna thorn scrub). (300-600 mm of rain/year, 8-11 dry months). Short annual grasses of less than 1 m and scattered trees up to 10 m.
- b. Intermediate rainfall woodland (Sudan savanna). (600-1000 mm of rain/year, 5-8 dry months). Short annual grasses up to 2 m, trees up to 15 m.
- c. High rainfall woodland (Guinea savanna). (1,000-1,500 mm of rain/year, 3-5 dry months). Denser woodland, taller trees and less grass. Climbing plants appear in the crown of the trees.
- d. The Jebels and rock outcrops found throughout the savanna characterised by special ecological conditions. Only a few specialised plants and animals can live on the bare rocks. Each of the savanna - types has its own characteristic plant animal species.



The Sahel savanna is characterised by Baobab trees (*Adansonia, Tebeldi*) and acacia trees. On clay soils *A. mellifera* (*Kitr*) dominates, on sandy soils *A. senegal* (*Hashab*), from which gum Arabic is collected, is also present.

In flooded areas of this zone the dom - palm (*Hyphaene thebaica*) prevails. Various thorny shrubs and low, annual grasses are typical. The desert - rose (*Adenium obesum*. Ar. *Sim Abmer*), the stem of which resembles the baobab tree, forms a conspicuous part of the dry savanna.

In the Sudan savanna the grasses are much taller and are mostly perennials instead of annuals. Several acacia - trees are typical of this zone (*A. seyal, Tallb*), and *Balanites aegyptica* (*Heglig*). Sausage trees (*Kigelia aethiopum*) and fan palm (*Borassus aethiopum, Doleb*) occur along the streams and rivers.

In the Guinea savanna many larger trees occur, and grasses are limited. Mahogany (*Khaya senegalensis-Humra*), *Isobertinia doka* (*Vuba*) and the shea butter nut (*Butyrospermum niloticum, Lulu*), and several climbing acacia species are typical trees of the Guinea savanna.

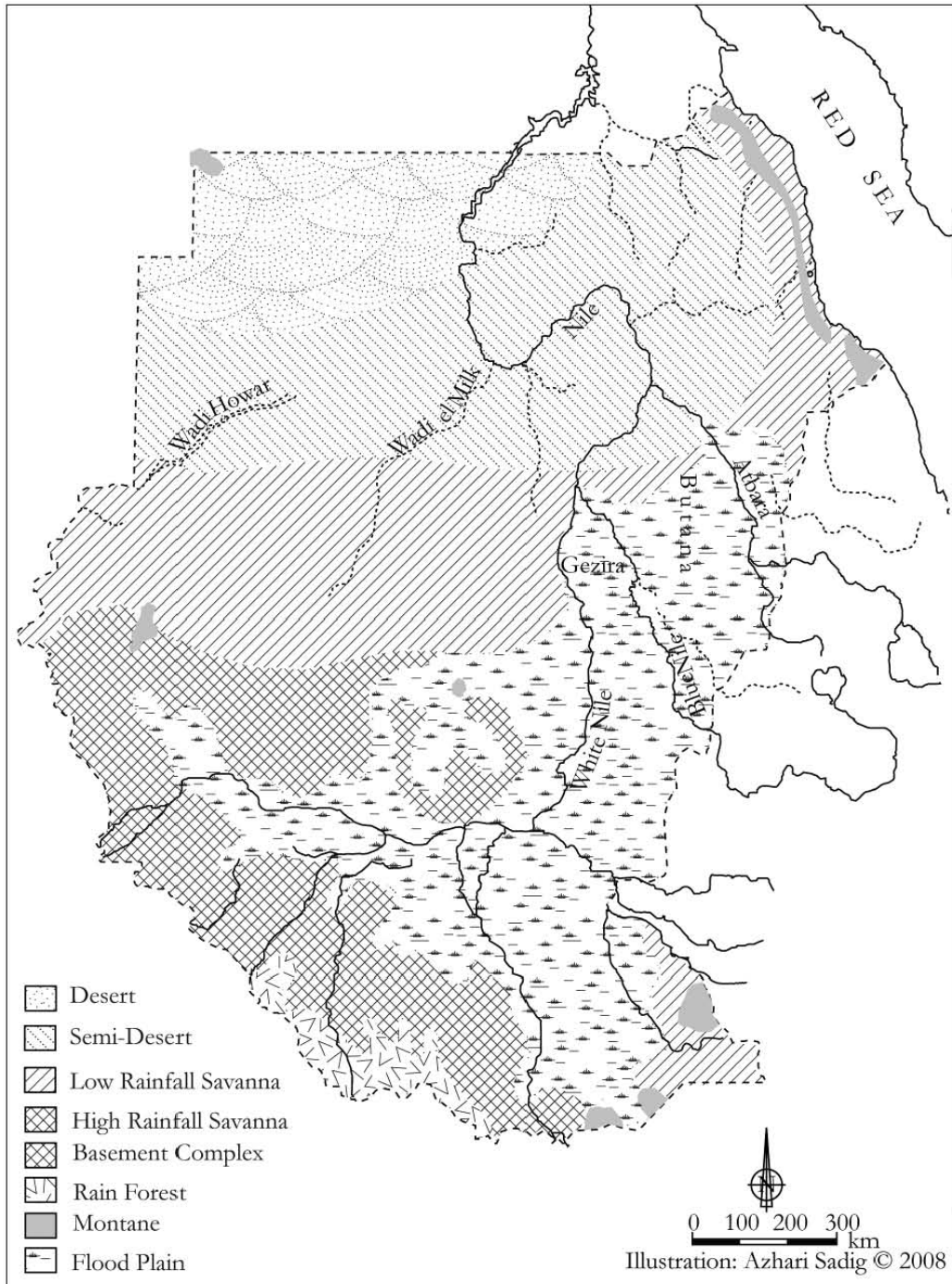
The tall-grass savanna is the main habitat for the larger mammals. During the rainy season food is abundant for them, but in the dry season they have to migrate. Various antelopes, zebra and the white rhinoceros are typical of tall-grass areas, whilst elephants, giraffes and monkeys are usually found among the trees (Andrew. 1948: 35, 38).

## Paleoenvironmental Conditions

Evidence for paleoecological changes has been evaluated in Wickens. The data are geological, archaeological and biological; it suggests that there have been significant climatic and ecological changes in the Sudan during the past 40,000 years. The main paleoclimatic conclusions can be summarised as follows:

- a. During the terminal Pleistocene the climate was cool, dry and windy at least as far south as latitude 10-12° N, and was probably semi-arid throughout much of southern Sudan.
- b. The early to middle Holocene (c. 10500 - 6000 BP) was wet and warm in Central Sudan and the present savanna zone of western Sudan. Late Pleistocene dunes became submerged beneath White Nile alluvium in Central Sudan, and further west small lakes and swamps occupied the depressions between the now vegetated and stabilised dunes.
- c. From about middle Holocene times onwards the climate became drier, and there was a progressive shift southwards of the rainfall, vegetation and faunal zones. Man's influence upon the environment became increasingly pronounced (Wickens. 1982: 30) (Map 1.6).

**Map 1.6: Hypothetical Early Holocene vegetation regions of Sudan (modified from Wickens, 1982, Figure 3.6: 42.)**



Wickens also identifies the following climatic changes for the period from 20,000 BP to the present:

Phase A. Very arid phase; 20000-15000 BP

Phase B. Comparable to the present climatic phase; 15000-12000 BP

Phase C. Very wet phase; 12000-7000 BP.

Phase D. Short dry phase; 7000-6000 BP

Phase E. Wet phase; 6000-3000 BP

Phase F. Present climatic phase; c. 3000 BP until today.

Some of the fossil evidence used to characterise some of the periods is the following:

- a. The fruits of *Celtis integrifolia* were discovered at the Khartoum Hospital site and Shaheinab (Arkell. 1949; 1953). The northern limit of present-day distribution of this tree is corresponding with the 400 mm isohyet. The present-day rainfall of Khartoum is 163 mm while that at Shaheinab is estimated to be about 100 mm. The minimum climatic shift necessary to obtain a rainfall of 400 mm at Shaheinab is in the order of 150 km north during the period E (Wickens. 1975: 46).
- b. The oil palm (*Elaeis guineensis*) was discovered at Nyama Suq in Darfur in a deposit dated between 12000 and 3500 BP in the time span covered by phase C (12000-7000 BP). It is estimated that a northward shift in the climatic and vegetation belts of at least 400 km would be required to explain the presence of oil palm on Jebel Marra. The nearest known locality for oil palm today is 600 km further south, across the border into the Central African Republic (Wickens. 1975: 47). A carbonised fragment of oil palm was also discovered at Shaheinab (Arkell. 1953). The oil palm occurs north of Yei, in an area receiving approximately 1,200 mm rainfall per annum. Consequently, the Shaheinab specimen must either have been transported down the Nile by either man or flood waters or, what is more likely, brought from Darfur by travelers (Wickens. 1975: 48).
- c. The *Acacia* sp., *Salvadora persica*, *Ziziphus* sp., and *Ficus* sp. were found at Jebel Tomat and dated to the period between 1930 and 1705 ± 60 BP. This find belongs to Period F (about 3000 BP until today). These species are not representative of any particular community; they are merely suggestive of dry-land vegetation rather similar to that found in the area today.
- d. The abundance of subfossil *Limicolaria cailliaudi* at Khartoum and Shaheinab (Arkell. 1949; 1953) indicates that the snail was flourishing and this suggests a rainfall in excess of 400 mm. This would suggest a northward isohyet shift of at least 300 km for Period E (Wickens. 1975: 50). The fauna that can be linked to this period is from the Neolithic site of Shaheinab. This consists of 32 species of mammals, of which three are domestic. Buffalo, giraffe and hippopotamus were most abundant. There is a noticeable absence of swamp-loving animals such as the Nile lechwe, which

were recorded at the Mesolithic site of Khartoum. The absence does not imply a reduction in rainfall as Arkell suggested (1953), merely an absence of swamps.

In addition to this evidence there are other indications that conditions in the Neolithic differed from the present situation. Arkell suggests that the flood level of the Nile was higher; as much as 5 m above the alluvial plain surrounding the Shaheinab site, which was partly inundated by the Nile. If the Nile was 5 m higher during the flood, the floodplain was around 6 km wider in the eastern area (the plain slopes slightly higher eastwards) (Haaland. 1981a: 46). The part of the alluvial plain suitable for human habitation was thus much smaller in Neolithic times than it is today. Only a narrow belt at the eastern edge of the floodplain was probably available for cultivation during the rainy season, although there is as yet no real evidence to suggest for cultivation in the Neolithic. When the Nile receded in the dry season, an area between Kadero I, II, Um Direiwa I, II and Zakiab would have been laid bare and provided good pasture for domestic stocks (Haaland. 1981a: 46). The volume of the Nile could have been increased by higher rainfall, either in the headwater of the White Nile or the Ethiopian highlands. East African lakes had high lake levels between the ninth to the third millennia BC, reaching a peak at about 7,000 BC (Zindern Bakker. 1972; Butzer et al. 1972: 1,069-1,076). Not only was the level of the Nile higher but there was also considerably higher local rainfall. Arkell compares the situation of the Khartoum area with that of the Malakal area (Arkell. 1953: 7-9), a view also adopted by Butzer and Hansen (1968), who suggest a 300 km northward shift of the zonal vegetation belts. With regard to the four sites studied by Tigani el Mahi, the amount of rainfall in the Central Nile Neolithic was estimated on the bases of recovered faunal remains from Shaheinab, Zakiab, Um Direiwa and Nofalab site (Tigani el Mahi. 1982). Among these animals were Warthog, black rhinoceros, giraffe and roan antelope. They indicate that the annual rainfall during the Neolithic time in the Khartoum district ranged between 300-700 mm. The following list shows the faunal remains at Zakiab and the minimum amount of rain required by various species (based on work done by Tigani el Mahi. 1982).

Warthog	requiring a minimum of 300 mm
Roan antelope	requiring a minimum of 500 mm
Tiang antelope	requiring a minimum of 500 mm
White-eared kob	requiring a minimum of 500 mm
Waterbuck	requiring a minimum of 500 mm

On the basis of the above-mentioned data, Tigani el-Mahi suggests that the rainfall was at least 500 mm per year (1982: 179). On the basis of plant remains (*Celtis integrifolia*) we may furthermore infer that the precipitation was probably more than 500 mm. The

paleobotanical evidence also showed the presence of *Sorghum bicolor*, morphologically not domesticated from Zakiab, Kadero I and Um Direiwa I (Magid. 1989). This plant requires more than 500 mm of rain yearly but this is not significant if it is cultivated near the river, on wet alluvium. The paleobotanical and osteological material identified at the Kadero I site strongly suggests the same climatological conditions as were found from Zakiab site, lies 18 km. north of Khartoum. The material yielded evidence of *Celtis* (Krzyżaniak. 1977: 166) and the remains of land snails like *Ampullaria* and *Limocolaria flamatta* (Krzyżaniak. 1977: 171). According to Haaland (1981a), the Khartoum Nile environment during Neolithic times would have consisted of three microenvironments, besides the river itself:

- a. The alluvial plain east of the high flood level of the Nile, i.e. east of the four base sites Kadero I, II and Um Direiwa I, II.
- b. The alluvial plain lay that bare during the dry season, when the Nile was low, i.e. the area between the base sites and the dry season camp site (Zakiab site).
- c. The higher area east of the alluvial plain, the Butana, which would have consisted of a woodland savanna type of vegetation (Haaland. 1981a: 47).

More relevant to the paleoclimatical condition of the Central Sudan is the evidence from the Shaqadud excavations in the Western Butana (Marks and Mohammed-Ali. 1991). Today, the area of Shaqadud falls within the semi-desert zone of north-Central Sudan, with very precarious summer rainfall not exceeding 150 mm at best (Whiteman. 1971: 5). The area really receives enough rain to fill watercourses and small depressions for some time. The general rule is that of desert conditions which limit the area's potential for supporting animals and a sparse semi-nomadic population (El Amin. 1992: 47). Along the main wadis and water courses grow a number of acacia species, shrubs and seasonal short grasses which provide grazing for animals. According to El Amin (1992: 50) climatic conditions during the Holocene were certainly conducive to human settlements as is suggested by the environmental data obtained from the excavation areas at the cave of Shaqadud and from some of the survey sites. The fauna is remarkably lacking in those species known in the Nilotic environment, except bivalves (*Aspatharia*) usually found associated with Khartoum Mesolithic and Neolithic cultures (El Amin. 1992: 50). The faunal remains from the upper layers of the midden site (Khartoum Neolithic) suggests a rather humid grass savanna with standing trees requiring an annual rainfall of some 450-500 mm (Peters. 1989: 469). The faunal remains collected from the cave layers suggest a shift to somewhat drier savanna conditions, with average rainfall of about 350 mm (Peters. 1989: 470).

A reconstruction of past conditions along the White Nile confirms evidence for a wetter climate south of Khartoum. The existence of huge, almost flat clay plains in Central and southern Sudan led early workers to postulate the former existence of lakes during wetter, pluvial periods. Arldt (1918) and Lawson (1927) envisaged large lakes (Lawson's Lake Sudd), and Ball (1939) extended his lake from Sabaloka (sixth Cataract) in the north to Shambe (near Juba) in the south, a distance of 1,055 km. Berry and Whiteman (1968) envisaged the former existence of a small lake up to 382 m wide impounded by a clay plug deposited by the Blue Nile at its confluence with the White Nile at Khartoum. Berry (1961) suggests that the large alluvial islands along the course of the White Nile had once been large mid-channel bars; he estimated that discharges had formerly been ten times greater than at present. He also postulates that, during high-flow conditions, the White Nile took on the lake-like characteristics of a very gently flowing river. Tothill (1946) shows that subfossil mollusca occur widely in the upper clay deposits of the Gezira, and it is upon the analysis of the occurrence of such fossils that current interpretations of the late quaternary history of the White Nile are based. Near Es Samra (western bank south of Omdurman), Williams and Adamson (1973) found shell-bearing sediments in a series of broad, shallow, highly localised depressions. Radiocarbon dating and a comparison of the subfossil mollusca found at these sites, with their present-day distribution, led them to conclude that between 7,000 and 8,500 years ago, when the White Nile itself was more extensive, small permanent lakes occupied these shallow depressions. This suggests that the climate in this area at this time was perhaps two to three times wetter than now, for *Limicolaria flammata* shells were found in the upper shell-bearing deposits; this land snail now occurs only south of Sennar, which has a mean annual rainfall of 460 mm compared to 163 mm at Khartoum.

At Esh Shawal, evaporite deposits of microcrystalline dolomite and calcite have been found. These range in date from about 2500 to >40000 BP and suggest late Pleistocene evaporation of a body of still, saline water along the course of the White Nile (Williams and Adamson, 1980). Above these evaporites lie 4 m of progressively more clay-rich river sands. At Tagra, fluvial fine sands and clayey sands were deposited up to 4 m above the normal minimum water level (i.e. before the Jebel Awlia Dam was built). At Esh Shawal, freshwater shells were found at 5 m above the mean minimum and 2.5 m above the mean maximum water level. The base of the top 1 m of dark alluvial clay at this site suggested a date of 11000-11500 BP, indicating inundation at this time up to at least 380 m. Near Shabona, archaeological investigations indicate that groups of prehistoric hunters lived on sand dunes overlooking Nile swamps. It has been shown that the Holocene White Nile attained a level of at least 379 m, which is 3 m above a contemporary uncontrolled flood level (Williams and Adamson, 1980; Adamson *etal.*1980). Conclusions based on

radiocarbon dating of shells indicate that the White Nile levels were high around 12500-11400, 8400-8100, 7000, 5500, 3000-2700, and 2000-1500 BP.

Adamson *et al* (1980) have attempted to draw together the evidence of White Nile change over the past years. Between 20000 and 12500 BP, cold dry conditions in the headwaters had profound effects on water and sediment supply to the White Nile. During this period, the river is thought to have been seasonal and intermittent, with the bed-load of sands reworked into aeolian dunes during the winter (Adamson *et al.* 1980). Around 12,500 BP Lake Victoria is thought to have overflowed, leading to major flooding along the White Nile. At that time, the Sudd did not act as an effective regulator of flow, so that vast quantities of water were released (Williams and Adamson. 1973). River levels dropped after about 11,000 BP but rose again from about 8,000 to 7,000 BP, when, as archaeological evidence shows, dunes existed on the clay plain on the east bank and were lapped by floodwaters which trimmed the dunes and deposited alluvial clays.

During the last 8,000 years, the White Nile has apparently incised some 2 m in response to down-cutting by the Blue and main Niles (Williams and Adamson. 1980). This incision was interrupted by periods of unusually high flood levels. Radiocarbon dates on *Pila wernei* (formerly *Ampullaria wernei*) shells at Guli, Tagra, and Shabona substantiate the view that there were high levels at around 5500, 3000, and 2700 BP. Fish bones and *Pila* shells at the Jebel Tomat prehistoric site confirm seasonally swampier conditions than today between 2000 and 1500 BP. *Lanistes carinatus* and *Pila wernei*, characteristic of seasonally fluctuating ponds, lakes, or rivers with a clay bottom, and that only occur in the parts of the acacia tall-grass zone with substantial rainfall, similar to that received by Malakal today (840 mm; see Tothill. 1946), have been reported from the Holocene lake beds west of Jebel Awlia, from Tagra (Adamson *et al.* 1974), from other sites along the east bank (Williams. 1968), from much of the Gezira clay (Tothill. 1946), and from north of Khartoum (Ruxton and Berry. 1978). At other sites only *Pila wernei* shells have been found and subfossil *Pila* ovate shells have not been reported. The specimens collected included a virtually complete shell. However, Omer el Badri (1972; reported by Williams and Adamson. 1973) recorded *Pila* ovate and *Lanistes carinatus* shells from a terrace 6 m above the present flood level.

The Blue Nile during the Mesolithic and Neolithic was characterised as a highly seasonal river. It was an unstable bed stream which laid down sandbars in its distal reaches. Later on, during the Holocene period, the Blue Nile was considered to be responsible for making or constituting the flood plain deposits of the Gezira clays. This highly seasonal river came to decrease by the middle and late Holocene times. Nevertheless, localised swampy closed depressions persisted for some time. This pattern is demonstrated by the distribution of the *Cleopatra buliomoides* and *Pila wernei* along the Blue Nile channel.

It is evident from the above evidence that the environmental conditions during the Mesolithic and Neolithic times were much wetter than at present. With reference to the animal and plant remains recovered from many sites, it is clear that there are some differences in environmental conditions during the two periods. For example, swampy conditions were attested by the recovery of evidence of some swamp-loving organisms. These organisms include reed rat, hippopotamus, *Salix Sebsrrate* (a plant) and protopterus fish. While all these were found in the Khartoum Hospital site, reed rat and *Salix Sebsrrate* were not found in Shaheinab. The latter two are known to frequent a very swampy habitat. Therefore, the absence of these two organisms in the Shaheinab site reflects a less swampy condition during the Neolithic period. This may also indicate that the Nile, in the course of time, dug its channel to a deeper depth than it had in Mesolithic times. Therefore, the water of the Nile might have covered a smaller area of land compared to Mesolithic times. In addition, the swampy conditions were known to have prevailed in many sites along the two sides of the Nile, e.g. Saggai (Caneva. 1983a), and Zakiab (Tigani el Mahi. 1982).

Among the identified animal bones collected from almost all of the Mesolithic and Neolithic sites, were crocodile and monitor lizard bones. Both animals need or require sandy beaches for laying their eggs. Moreover, crocodiles need swamps along the rivers and open waters (Tigani el-Mahi. 1982: 169) beside the sand beaches. It seems that this condition had been available during the Mesolithic and Neolithic times. The regions from which these conditions evaluated are now under the semi-arid and arid belts. These regions suffer from the absence of verdure and the process of desertification. The identified animals and plants found at the archaeological sites are now found in the far southern zones (savanna and rainy forests), where optimum environmental conditions are found and which are similar to those prevailing in Nubia and Central Sudan during the Mesolithic and Neolithic times.

Regarding Nubia; the paleoclimatical conditions appear similar though not identical. The Scandinavian Joint Expedition published two volumes containing rock drawings in Nubia (Save-Soderbergh. 1970). The rock drawings from many periods present the depiction of large animals; both wild and domestic (Plate 1.1). These include cattle, goats, dogs, elephants, hippopotami, warthogs, rhinoceros, asses, giraffes, antelope, felines, hyenas and others. The giraffe, known for its woodland savanna habitat, lives in areas which receive a minimum annual rainfall of 300 mm (Tigani el-Mahi. 1982). That may indicate wetter conditions prevailed there during prehistoric times in Nubia. However, we cannot relate these rock drawings to any known period. Unfortunately, there is no scientific method by which such art can be dated. It should also be taken into account



that some figures depicted on the rock drawings were imaginary ones and have no relation to the environment where these rock drawings were found.

**Plate 1.1: Rock drawings from the Abkan site (IX) (source: Myers. 1958.)**



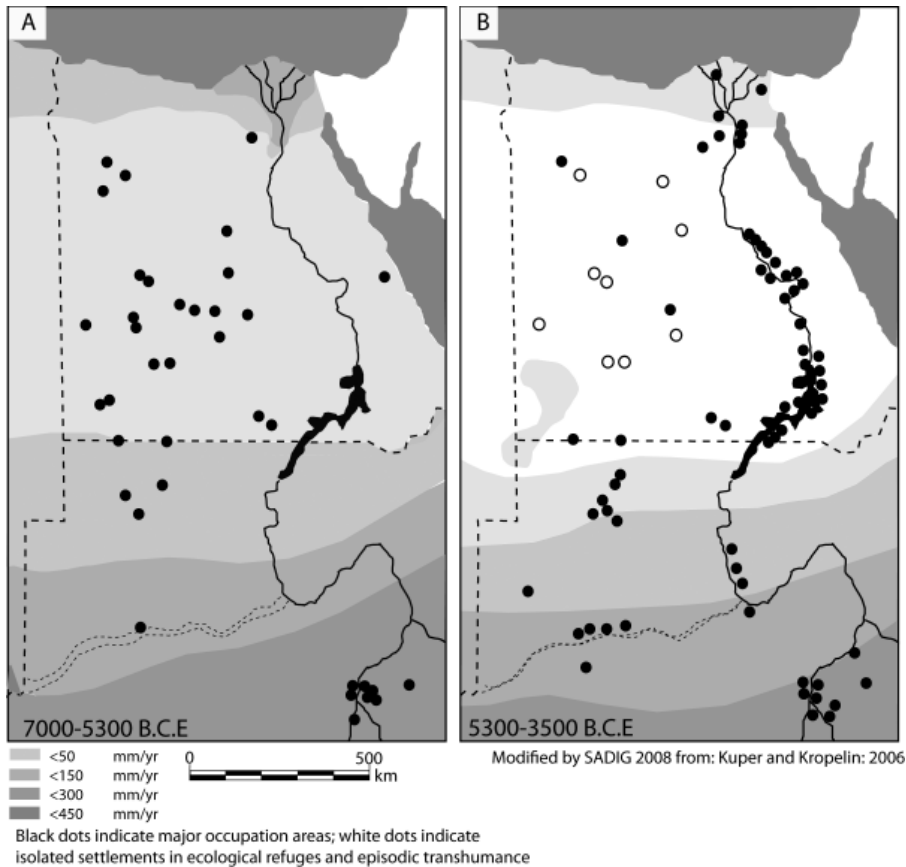
## Evidence from Neighbouring Regions

Investigation of Mesolithic and Neolithic settlements on the eastern Sahara of Egypt has lead to some conclusions about the paleoenvironmental evolution of this area during the early to mid-Holocene (8500-3500 BCE) (Kuper and Kröpelin. 2006: 803) (Map 1.7).

- a. After 7000 B.C.E., human settlement became well established all over the Eastern Sahara, fostering the development of cattle pastoralism.
- b. Retreating monsoonal rains caused the onset of desiccation of the Egyptian Sahara at 5300 B.C.E.

Prehistoric populations were forced to the Nile valley or ecological refuges and forced to exodus into the Sudanese Sahara where rainfall and surface water were still sufficient. The return of full desert conditions all over Egypt at about 3500 B.C.E. coincided with the initial stages of pharaonic civilization in the Nile valley

**Map 1.7: Climate-controlled occupation in the Eastern Sahara and Sudan during the main phases of the Holocene**



The principal conclusions may be summarised as follows:

- a. Early Holocene reoccupation (8500 to 7000 BCE): With the rapid arrival of monsoon rains at 8500 B.C.E., savannah-like environments turned the eastern Sahara into a habitable region, and prehistoric humans soon settled there.
- b. Mid-Holocene formation (7000 to 5300 BCE): After 7000 BCE., human settlement became well established throughout the eastern Sahara by way of economic and technological adaptations to regional ecological requirements. The most important achievement of this phase is the introduction of domestic livestock.
- c. Mid-Holocene regionalisation (5300 to 3500 BCE): Retreating monsoonal rains caused the onset of desiccation of the Egyptian Sahara at 5300 BCE. Prehistoric populations were forced to the Nile valley or ecological refuges, and to migrate into the Sudanese Sahara, where rainfall and surface water were still sufficient. After 3500 BCE, rains ceased, even in ecological niches such as the Gilf Kebir, and permanent occupation was restricted to southern areas, such as Laqiya and Wadi Howar in northern Sudan.

## 2

# Defining the Neolithic of the Middle Nile Region

The term “Neolithic” was first used by Sir John Lubbock to mean “New Stone Age”, characterised by the use of ground and polished stone tools and pottery (Daniel. 1975). It is also used to describe the final phase of the Stone Age, following the Mesolithic. The Neolithic begins at widely differing dates in different regions of the world. For example, in the Middle East the period starts as early as the 10th millennium BC, while the onset of the Neolithic is identified across much of northern and Central Europe with the arrival of the farming Linearbandkeramik (LBK) culture, between the 6th millennium BC (Hungary) and the 4th millennium BC (northwest Europe) (Shaw and Jameson. 1999: 422). Although the Neolithic was originally defined with reference to the presence of ground and polished stone tools in lithic assemblages, it quickly became associated with a major set of cultural and economic changes, including the use of pottery, the domestication of animals, agriculture and sedentary living.

The presence of pottery and ground stone tools at the site of Khartoum Hospital (ca.7000 BC) caused it to be considered Neolithic although it lacked evidence for domestication. Thus, the Neolithic in Khartoum area has included both the sites of Early Khartoum and Shaheinab (Mohammed-Ali. 1973; 1981. 176). These two sites are quite different regarding the stone tools, ceramics, and economies found there. Only Shaheinab shows evidence of domestication namely, the presence of dwarf goat (Arkell. 1953: 15) and cattle (Haaland. 1987a: 187).

In the author’s view, it is more convincing to associate pottery with permanent or semi-permanent settlement patterns (whatever the economic modes of its makers) than to associate it with a particular economy, such as a food-producing economy. Because pottery is delicate and fragile, it is difficult to preserve when the mode of life necessitates mobile settlement and rough handling. The site of Early Khartoum is a good illustration of this, as pottery was found there in considerable quantities but not even a single piece of evidence is available to show that plants and/or animals had been domesticated.

In some coastal Mediterranean areas pottery and, perhaps, animal domestication seems to have arrived *before* the full adoption of cereal agriculture. In other areas, hunters and gatherers seem to have evolved sedentary or semi-sedentary settlements before the advent of farming or to have adopted the use of pottery and apparent Neolithic stone industries

without developing farming economy (Shaw and Jameson. 1999: 423). An example of the latter is the Central Asian Keltiminar “culture”, often described as “Neolithic” in the literature because of technological developments (particularly the adoption of pottery), even though the economy was entirely based on hunting and gathering.

Traditional views also considered grinding and polishing of stone tools as criteria for defining a Neolithic society. Lord Avebury (in Daniel. 1975: 85-6) believed that the “New Stone Age” was a stage characterised by the manufacture beautiful weapons and tools of flint and other kinds of stone. Beyond a doubt, this definition is based fundamentally on technological and artistic grounds.

In relation to the current debate about an appropriate definition of the Neolithic age, Childe (1952) argues that the Neolithic stage, which he considered to be a revolution, was in fact the ability of mankind to produce food by plant cultivation and animal breeding. Confirming Childe’s arguments the most current, reasonable and comprehensive definition of the Neolithic is proposed by Renfrew and Bahn (1998: 543). They state:

Neolithic is an Old World chronological period characterized by the development of agriculture and, hence, an increasing emphasis on sedentism.

This definition suggests that the Neolithic is a convenient socio-economic development rather than a technological one.

## The Concept of Neolithic in Sudanese Archaeology

Most studies of the Neolithic in the Sudan are based on a definition that does not fully confirm the above definitions. While these studies cover a large temporal and geographical area, it is interesting to note that, with very few exceptions, most of them focus on sites that reflect no more than one aspect of form the definition of the Neolithic. This is an important point because this approach also defines a general concept of Neolithic and its relation with the Mesolithic culture that also reflects major traits of this stage (pottery, grinding and polishing of stone tools).

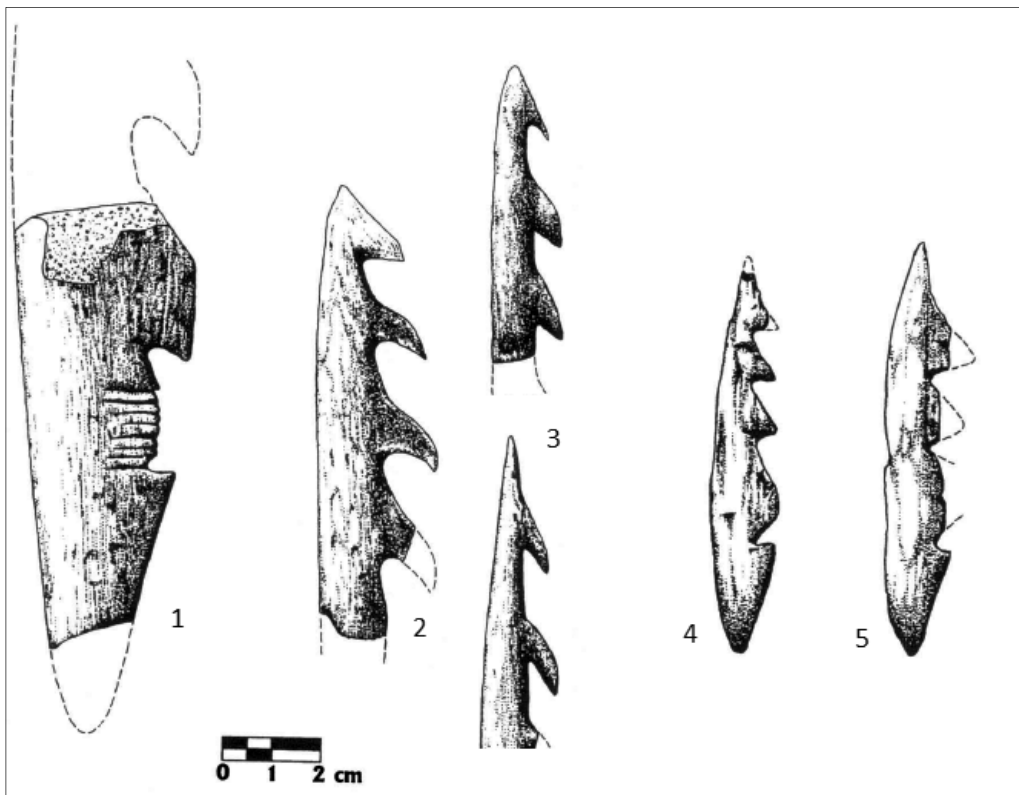
### **Khartoum Mesolithic**

Arkell (1949) introduced the term “Khartoum Mesolithic” (Map 2.1) to designate the assemblage recovered from the Khartoum Hospital site, and he justified its applicability by the lack of direct evidence of domestication there. The site is characterised by evidence of hunting and fishing subsistence pattern highly adapted to the riverine environment. The material culture includes microlithic tools and hand-made “wavy-line” globular ceramics (decorated with fish-bones or rocker-stamps), but there is no indication of plant or animal domestication. The term Khartoum Mesolithic has been criticised (see

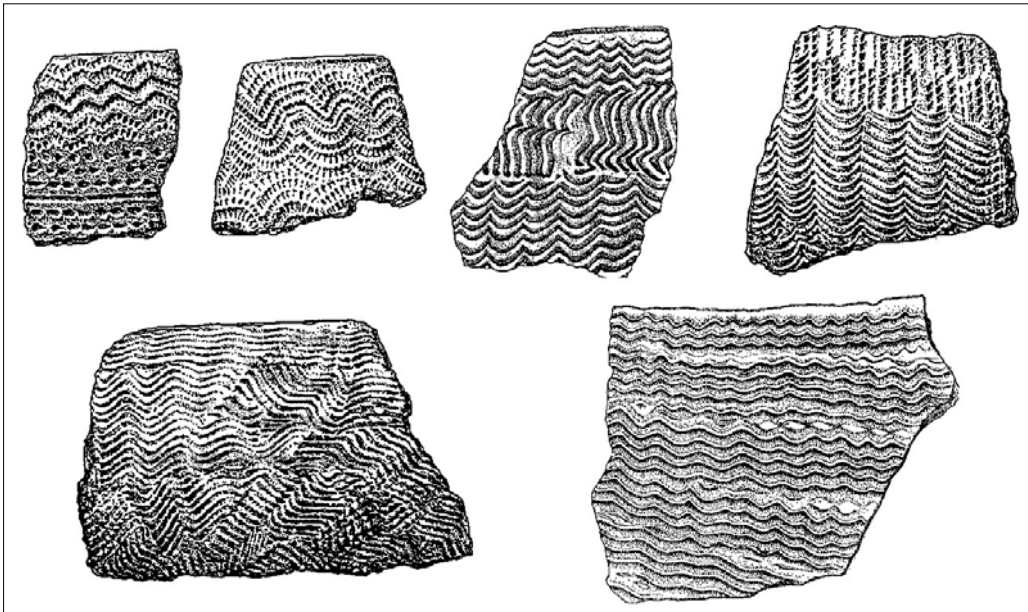
Mohammed-Ali. 1982) but has also been used widely, and its use continues to dominate in the literature.

Later scholars elaborate and extended Arkell's concept of a Sudanese Mesolithic based on loose similarities in the patterning of cultural remains. Barbed bone points and pottery decorated with "wavy-line" and "dotted wavy-line" motifs (Figures 2.1, 2.2 and 2.3) achieved the status of type fossils in Africanist archaeology, and came to be used by almost all archaeologists in their effort to understand the dynamics of Early Holocene societies of the Sahara and the Nile (Aumassip. 1978; Camps. 1978, 1980; Gabriel. 1978; Kuper. 1978). The Sudanese Nile Valley was considered as the core area from which a new lifestyle spread during the Early Holocene (Haaland. 1992).

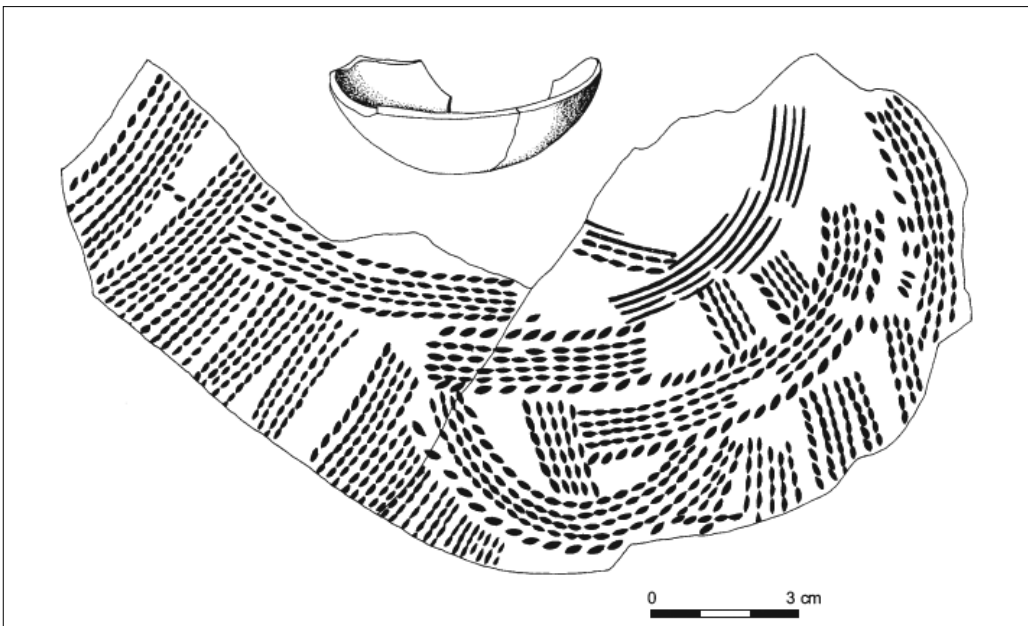
**Fig 2.1: Mesolithic barbed bone points. 1, 2, 3 Khartoum Hospital site, 4 and 5 Atbara region**



**Fig 2.2:** Incised wavy line and impressed wavy line (dotted wavy line) pottery from Central Sudan (Sources: Arkell 1949; Caneva 1991.)



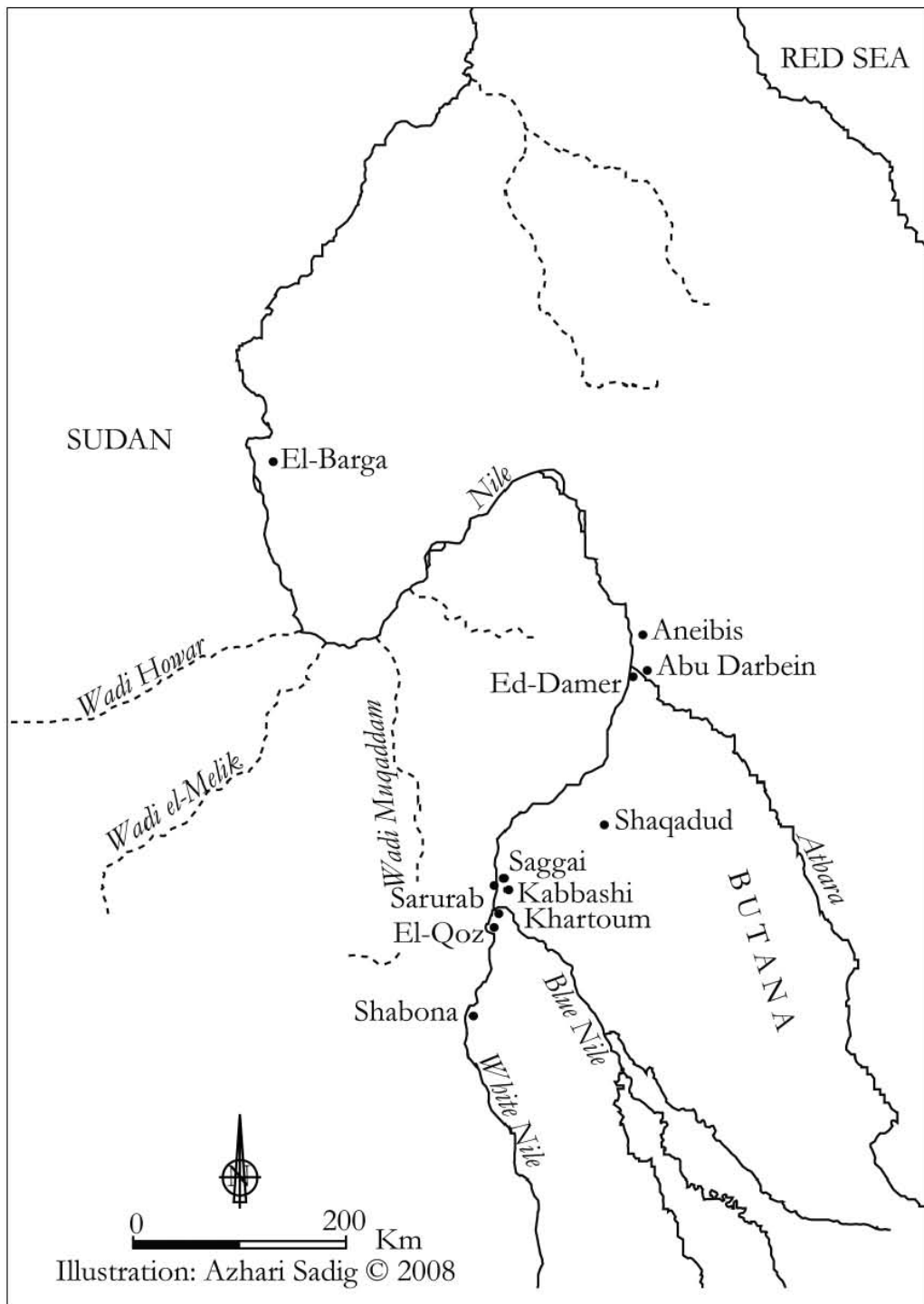
**Fig 2.3:** A small pot decorated with dotted wavy line design from the Mesolithic site of Aneibis (Source: Haaland 2007.)



The data available on the Khartoum Mesolithic have increased considerably in the last few years through the work of several archaeological missions concentrating on this subject. At present, both the terms “Mesolithic period” and “Early Khartoum” are used in the archaeological literature (Caneva. 1983a; Clark. 1989; Fernández *et al.* 1989; Haaland and Magid. 1995, Marks and Mohammed-Ali. 1991, El Amin. 1992) and others with wider research goals (Kuper. 1981; 1988; 1989). Further north, in Lower Nubia, the pottery seems to appear only later, around 4500 BC, in late-Shamarkian. To the south, although there are significant gaps in spatial distribution, wavy line pottery is known, as well as in Central Sudan, in Upper Nubia, and up to Lake Turkana in northern Kenya. Recently, a site containing wavy line pottery was investigated in El-Barga, in the region of Kerma in Upper Nubia, and contemporary tombs have been identified within and near the site. The fauna collected confirms that the economy was based on hunting of wild animals and fishing (Honegger. 2004).

In the Middle Nile Region, sites with early wavy line and dotted wavy line pottery include Saggai (Caneva. 1983b), Sarurab (Khabir. 1981: 160–161; Mohammed-Ali. 1982: 173, Figure 1), Kabbashi Haitah (Caneva *et al.* 1993: 226–228), Shabona (Clark. 1989: 389), Shaqadud (Mohammed-Ali. 1991: 87–88), Abu Darbein, el-Damer, and Aneibis (Haaland and Magid. 1992) and from Al-Barga near Kerma (Honegger. 2004). From Saggai a suspect date, based on *Pila* shell, of  $10,060 \pm 150$  BP, was obtained from the Mesolithic assemblage (Caneva, 1983b: 149). It is, in any case, the earliest date so far obtained for a ceramic-bearing site not only in the Sudan but in the whole of Africa and the Middle East. Four other radiocarbon dates, based on *Pila* shell and ranging between  $7410 \pm 100$  BP were obtained for the site (T-5025) and  $7230 \pm 100$  BP (T-5024) (Caneva. 1983b: 152). The earliest date from Sarurab,  $9370 \pm 110$  BP (HAR-3475), was associated with various types of wavy line pottery, ground stones, microlithics, and bone harpoons (Khabir. 1981: 160–161, 1987; Mohammed-Ali. 1982: 173). Further north, in the Atbara reach, wavy line and dotted wavy line ceramics are well dated at Abu Darbein, el-Damer, and Aneibis Mesolithic settlements. The wavy line and dotted wavy line pottery was radiocarbon dated at Abu Darbein by eight samples ranging between  $8640 \pm 120$  BP (T-8624) and  $7700 \pm 140$  BP (T-5728) (Haaland and Magid. 1992: 23). El-Damer has yielded 13 radiocarbon dates, seven of which were obtained from graves. The oldest date is  $8390 \pm 50$  BP (T-7485), whereas the most recent is  $7260 \pm 110$  BP (T-8631). Aneibis has provided 17 radiocarbon dates, providing a time span ranging from  $8230 \pm 120$  BP (T-8643) to  $6820 \pm 170$  BP (T-7481) (Haaland and Magid. 1992: 23).

**Map 2.1: Location of Mesolithic sites in the Middle Nile Region**





According to these dates and other pottery elements, the Mesolithic comprised two main periods, an early period and a late period, dated 8600-6500 BC and 6500-5500 BC, respectively. The earliest sites are located at Abu Darbein, ed-Damer, Saggai and Sarurab. El-Qoz, Kabbashi and Shaqadud yielded stratigraphic sequences with late Mesolithic material following that of the early Mesolithic. Late Mesolithic pottery is represented by impressed dotted wavy lines, which replaced incised wavy lines. According to Mohammed-Ali and Khabir (2003), the archaeological evidence from the Central Nile Valley indicates that both types were present at Khartoum district sites in all layers from the beginning of the occupations. Hence, the dotted wavy line was not an outcome of the wavy line, as Arkell has suggested (Arkell. 1949: 84–85, 1953: 68). In the Sahara-Sahel context, dotted wavy line pottery appeared earlier, as Tagalagal, ca. 9500 BP (Roset. 1987); Bir Kiseiba, ca. 9100 BP (Connor. 1984); Ti-n-Torha, ca. 9000 BP (Barich. 1987); Nabta Playa, site E.7.8, ca. 8800 BP (Banks. 1980) than the wavy line pottery e.g. Amekni, ca. 8300 BP (Camps. 1969); Delibo Cave, ca. 7300 BP (Bailloud. 1969).

Some scholars, among whom Mohammed-Ali (1973, 1982), believed that the Khartoum Hospital site was Neolithic site. He stated that (1973: 91) the Early Khartoum site “*has a cemetery of more than 17 burials which indicates a settlement with stable sources of subsistence; pottery that showed a highly distinctive and evolved type of decoration as well as polished tools and microlithics, makes it difficult to avoid the conclusion that it is a (Neolithic Culture) whether they practiced domestication or not*”.

In this author’s opinion defining Neolithic by means of these criteria (pottery, microlithic and polished tools) is in complete contradiction to the current definition of a Neolithic culture.

Further, Mohammed-Ali has only given us a vague statement by saying “settlement with stable sources of subsistence”. Moreover, it is not enough to have permanent settlement for establishing a Neolithic way of life. This is because settlements with or without burials were documented, i.e. from Near East and south-west Asia, where caves were used as semi-permanent and/or permanent dwellings, but people were still practicing a hunting-gathering economy. Evidence for this was found at the Mureybet site (7542±122 BC) and Bougras site (6190 ± 60 BC) in Syria (Mellaart. 1975: 283-284). These sites revealed what came to be known as “hunters” villages; that is to say, people had permanent settlement, but they were still hunters and gatherers.

Thus, the people who occupied the prehistoric site at Khartoum Hospital may have had typical settlements but they were practicing a hunting-gathering economy. However, this type of economy in a direct or indirect way, necessitates seasonal movements whether over long distances or in the vicinity of the “base site”.

For all that has been cited above, the logical conclusion is that the site of Khartoum Hospital and the like, i.e. Saggai, Tagra, Aneibis, and others, are not Neolithic sites.

Even the term Mesolithic is not applicable to these sites, because it is evident that the term “Mesolithic” has not been used elsewhere to indicate sites that combine a lack of evidence of food-production with a well-developed ceramic technology. Using the term Mesolithic for this purpose would require redefinition of the term Mesolithic itself and of the boundaries between it and the Neolithic. For a long time the term Mesolithic was simply a catch-all for the uninteresting time between the glories of Paleolithic art and the economic and social “revolution” of the Neolithic. Clark (1980) records the reasons why the term Mesolithic tended to be avoided by archaeologists (e.g. Childe) early in the last century, and he charts the first uses of the term. A more positive definition of the period is that it begins with the invention of geometric microlithics; the interval between the Magdalenian and this shortened Mesolithic is then reclassified as the Epipalaeolithic. This can confuse the wide-ranging reader; however, as the term Mesolithic is rarely employed in the archaeology of southeast Europe, North Africa and south-west Asia. Instead, “Epipalaeolithic” is generally used to describe any assemblages after the main Würm glaciation and which has a microlithic component (Shaw and Jameson. 1999: 394).

Moreover, like the other major divisions of prehistory, the Mesolithic is associated with fundamental socio-economic (as well as technological) changes. The Mesolithic hunter-gatherer-fisher groups of the Central Sudan were involved in a complicated process of innovation, which is revealed by the presence of pottery production, food processing, the exploitation of a wider range of food resources, and sedentism, with the side effects of higher female fertility and population growth (Haaland. 1995). In this respect, there is general agreement that the Mesolithic economy made increasing use of plant foods, although the direct evidence for this remains relatively scarce. Some scholars have been tempted to see “pre-adaptations” to the coming agricultural revolution in the intensifying use of plant resources, suggesting that a primitive form of animal husbandry developed in the Mesolithic (Shaw and Jameson. 1999: 394). They also point to the domestication of the dog, the development of storage facilities and associated semi-sedentism, and the social developments reflected in the advent of “cemeteries” in some regions and the increasing deposition of grave goods.

### **Khartoum Neolithic**

Arkell’s work at Shaheinab proved that the site was an occupation site with remains of ash, pottery with different decorative patterns, numerous amounts of lithic artifacts, shells and bones of domesticated animals. This site is the first of its kind in the area of Khartoum which could be called Neolithic (also called Khartoum Neolithic and Gouge culture). Some main characteristics of “Khartoum Neolithic” were largely evident in Sudan and the Sahara. The term Khartoum Neolithic has been applied to a number

of assemblages which share some general features with that of Shaheinab but lack any evidence for food - production. The Khartoum Variant, one of the Neolithic industries of Sudanese Nubia (Shiner. 1968a; 1968b), was so named on the basis of a few broad similarities in ceramic motifs to the Khartoum Mesolithic but not to the Khartoum Neolithic. However, the Khartoum Variant lacks the features that are diagnostic of either and there is no evidence of food - production in the Khartoum Variant.

While pottery and domesticated animals might well co-occur, the question arises as to what degree it can be considered as characteristics of every Neolithic site in Nubia and Central Sudan. Does the absence of a food-production economy in sites that share other characteristics of the Khartoum Neolithic mean these sites are not Neolithic?

With reference to the evidence available so far, I think that most probably at Shaheinab settlement and other Neolithic sites, the people practiced a traditional food - gathering economy supplemented by a few domestic animals. Most of the Neolithic sites in the area showed evidence indicating the importance of hunting, gathering and fishing. On the other hand, no evidence of domesticated grains has been found yet. With reference to the definition of the Neolithic mentioned above, the special criterion of the Neolithic in Nubia and Central Sudan is the presence of domesticated animals on some of the Neolithic sites.

Pottery and grinders were well developed in Neolithic sites in the two regions. But the geographical distributions, patterns of pottery and lithic production and usage, and product development are all supportive of the idea that describing the Neolithic of Nubia and Central Sudan in terms of the “invention” of food-production is incorrect; it was rather a period of establishing technological industries based on much earlier inventions.

Consequently, the terminology used in this book is based on this last definition, although the terms used are not the restrictive ones but rather terms which have been adopted from general archaeological usage. Therefore, the term Neolithic will be reserved for sites containing evidence of similar known “Neolithic” elements along the Middle Nile. The difficulty with using this type of terminology is that there is no single agreed standard and many terms have different definitions, depending on the user.

## **Current State of the Research**

Since Arkell's excavations at the Neolithic site of Shaheinab, completed by the end of the 1940s (Arkell. 1953), interest in the Neolithic culture-history of the Middle Nile Region has increased significantly, especially during the last forty years. After the end of the Aswan High Dam campaign, the field-research shifted to Central Sudan. Since then, large-scale excavations have been carried out in this area at sites such as Geili, Kadero I, Islang, Nofalab, Rabak, Um Direiwa, el Kadada, el Ghaba, and Haj Yousif (Caneva. 1988, Krzyżaniak. 1978, Mohammed-Ali. 1982, Haaland. 1987a, Geus. 1984a, 1984b, Fernández et al. 2003).

Despite many excavations carried out in Nubia since the beginning of the last century, the Neolithic of the area attracted little interest. This may be because the Nile Valley was considered as a marginal area which had not played a significant role in the appearance of the Neolithic life (Wendorf. 1968a; 1968b).

It was only in 1947 that the first excavations on Neolithic sites were carried out in Nubia, at the time when Myers (1948), assigned to Gordon College, decided to undertake prehistoric research in the area. In 1957 he returned for a second excavation at the site but he died in 1966, without publishing his findings, though apparently the manuscript was almost completed. In fact, two years after Myers' second expedition, the High Dam campaign began. This time, large-scale research programmes were, at least partially, devoted to prehistory.

After the end of the Aswan High Dam campaign, the field - research shifted to eastern Sudan (mainly Khashm el Girba, see Shiner *et al.* 1971). Later, large-scale excavations were carried out in Central Sudan at sites such as Geili (Caneva. 1988), Kadero I (Krzyżaniak. 1978), Islang (Mohammed-Ali. 1982), Nofalab (Magid. 1981, Khabir. 1991), Zakiab, Rabak, Um Direiwa I and II (Haaland. 1987a), el Kadada (Geus. 1984a, 1984b), el Ghaba (Geus. 1984a), and Haj Yousif (Fernández *et al.* 2003). This process was certainly the result of the strategy of the Sudan Antiquities Service, who channeled field - research to the area which was becoming increasingly endangered by a variety of industrial and agricultural projects. It was also part of the general process of the shifting attention of the international archaeological community to the area south of Nubia after the filling of the High Dam Lake (Lake Naser) in the early 60s and the termination of the extensive salvage programme between first and second Cataracts.

During the last decades there has been a remarkable intensification in research into Neolithic sites in Upper Nubia, especially in Dongola Reach. In addition to other discoveries, which pertain mainly to the Neolithic, these surveys led to the identification of a large number of small mounds, some of which appeared to contain burials and/or artifacts, more particularly pottery that could be attributed to the Neolithic culture. After larger surveys and excavations in the Dongola Reach (Welsby. 2001), national and international archaeological research in the area threatened by the construction of Merowe Dam has increased during the last few years. Although the list of excavated sites appears to be long, only a small handful of sites have been the subject of full scientific investigation. As a consequence, much of the available settlement evidence appears to have been incidental discoveries during the course of salvage excavation or while investigating later settlement sites and structures. Therefore, information on the nature of settlement patterns, burial or ceremonial traditions are still sparse.

# 3

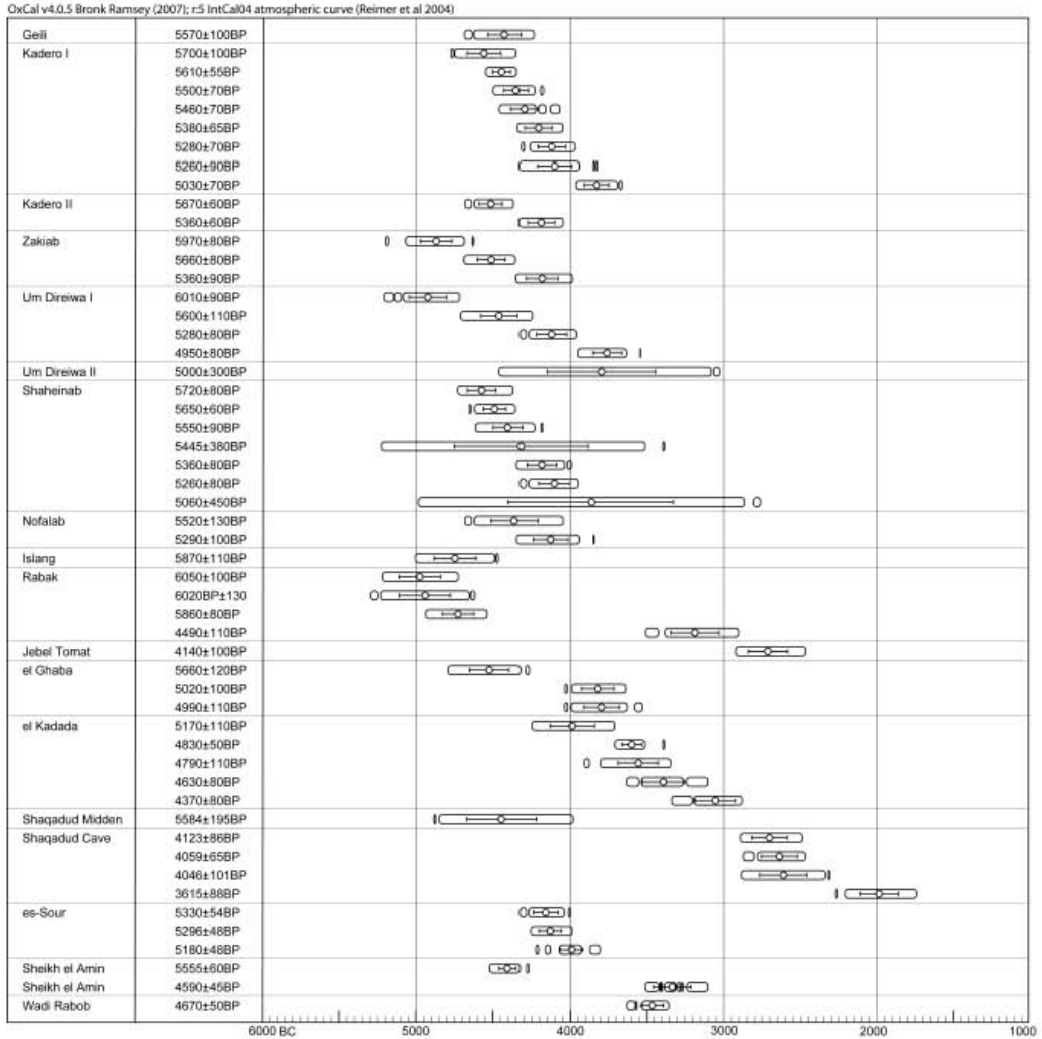
## Chronology and Cultural Development of the Neolithic

The Neolithic begins at widely differing dates in different regions of the world. For example, in the Middle East the period starts as early as the 10th millennium BC, while the onset of the Neolithic is identified across much of northern and Central Europe with the arrival of the farming *Linerbandkeramik* culture between the 6th millennium BC (Hungary) and the 4th millennium BC (northwest Europe). In Sudan, one of the most serious problems of studying the changes over the fourth millennium is to draw chronological parallels between sites and regions. A number of terms have been used to describe these phases, some of which are more confusing than enlightening.

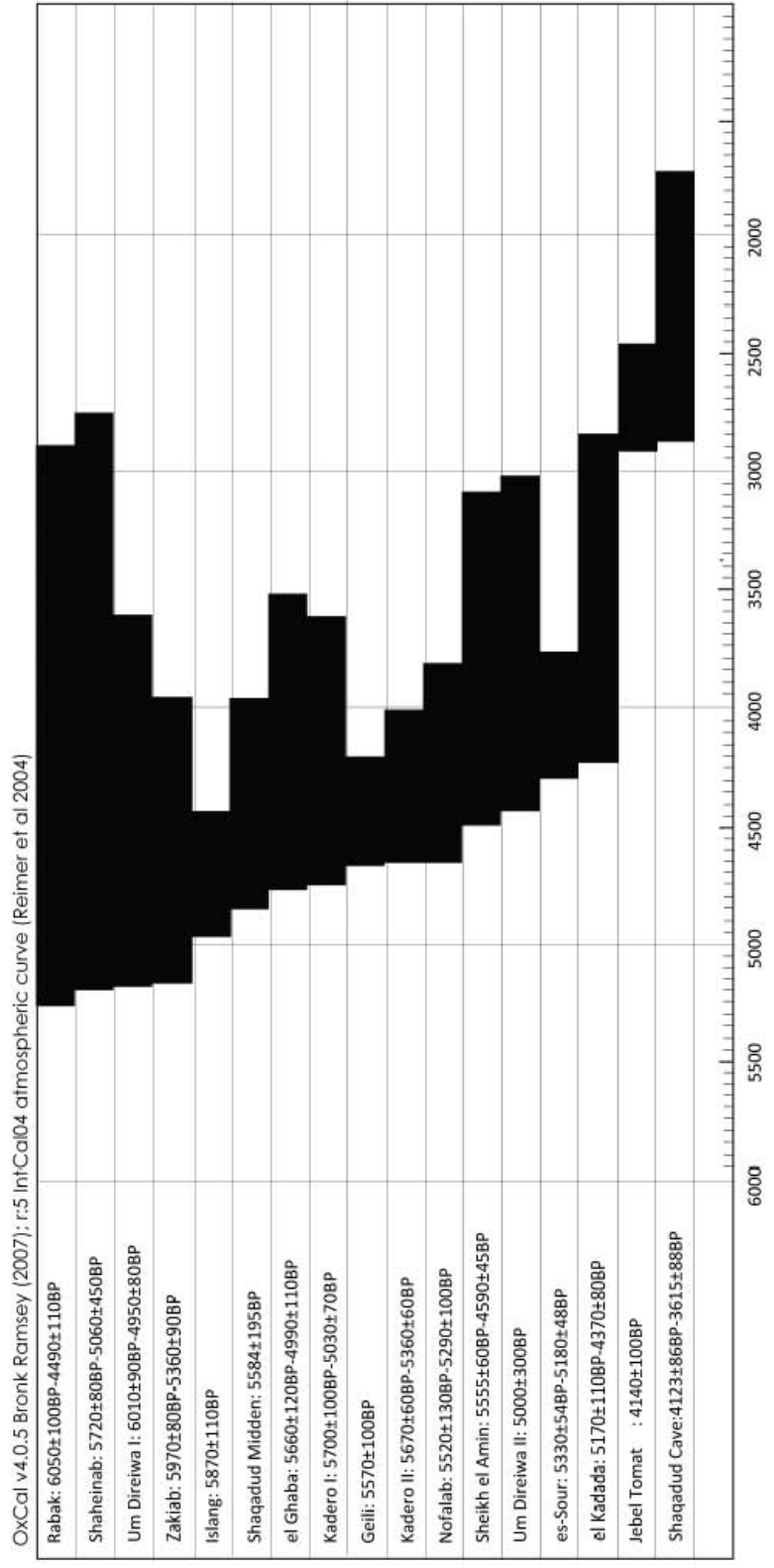
### Central Sudan

Many radiocarbon dates were obtained from Neolithic sites in Central Sudan. Some of them are shown in table 3.1 (see also Figures 3.1a and 3.1b). These dates indicate that the Neolithic in the Central Sudan ranges between 4915 BC and 2095 BC, covering a period of at least 2,820 years. Most of the sites flourished during the 5th millennium BC, others extended till the 4th millennium BC, while the site of Shaqadud extended till the first decades of the 3rd millennium BC.

**Fig 3.1a: Distribution of some radiocarbon dates available for the Neolithic of Central Sudan**



**Fig 3.1b: Distribution of some radiocarbon dates available for the Neolithic of Central Sudan**



From this list of the available dates it appears that:

- a. The Neolithic sites of Um Direiwa I and II, el Ghaba, Islang, Rabak, Shaheinab, and Kadero I and II date to the 5<sup>th</sup> millennium and survived during the first part of the 4<sup>th</sup> millennium (Haaland. 1987a, Geus. 1984a, Mohammed-Ali. 1982, Arkell. 1953, Krzyżaniak. 1978).
- b. There are a few sites in Central Sudan, such as Um Direiwa I and Rabak, whose culture debris consists of remains ranging from the beginning of the Neolithic in the area (*ca.* 4900 BC) to its latest phase (*ca.* 3250 BC) (Haaland. 1987a).
- c. The site of Rabak provides the earliest date of the Neolithic (Haaland. 1987a). It includes typical Shaheinab material and therefore could be the earliest site known, to date, that shares material with the Khartoum sites.
- d. The two sites, el Kadada and Shaqadud cave, offer a different panorama, with dates in the 4<sup>th</sup> and 3<sup>rd</sup> millennia BC. The fourth date of Shaqadud Cave sheds more light on the chronology of Central Sudan, since Shaqadud Cave is the only site that survived the 3<sup>rd</sup> millennium.
- e. The cemeteries of el Ghaba, Kadero I and el Kadada provide a continuous Neolithic sequence from the beginning of the 5<sup>th</sup> to the very end of the 4<sup>th</sup> millennium BC.

Shaheinab phase lasted far longer than originally thought; it lasted for at least 1,000 years. This culture persisted and developed in other sites like Kadero I. Throughout Central Sudan there was a considerable variation in the duration of the Neolithic.

The Shendi homeland had more than one assemblage (Early Neolithic at el Ghaba, Late Neolithic at el Kadada, es-Sour and Post-Neolithic at Makbour). In Khartoum region the structure and chronological relations between different sites varied widely. Nevertheless, it can be hypothesised that the sites accommodated similar economic systems, typified by various modes of similar goods. Considerable variation existed in the time duration of every site. Chronologically, the western bank sites were remarkably different from those on the eastern bank. Sites with almost exclusively early Neolithic style cultural material on the west bank, e.g. Shaheinab, Islang and Nofalab, survived for about 860 years.

By contrast, on the east bank, surveys and excavations suggest that occupation existed at sites like Kadero I (Krzyżaniak. 1978) for longer than initially thought. The eastern bank sites have existed for about 1,000 years. There are no large differences in the two microenvironments, and the Neolithic life appears to have been similar. The short duration of occupation in the western bank sites may have been due to other reasons, and the limitations of archaeological research must always be considered. The term Late Neolithic is applied to some sites that share similar material culture, graves, and subsistence economy.



Some sites, such as Shaqadud Cave site, are related to this period although they exhibit exclusively local material culture and mode of life. Other sites, e.g. es-Sour and el Kadada, suggest dates belonging to the Late Neolithic, although they maintained and continued without any changes throughout time - span. There is however sufficient evidence to show continuity in these sites, and to suggest that they represent a continuous cultural tradition. An unknown sequence of occupation can be traced through the 4<sup>th</sup> millennium BC. This means that any attempt to divide the Neolithic period of Central Sudan must include specific studies of the material culture and modes of life. Any division must not be restricted to chronology; it must also be applicable to all the cultural elements of every site.

**Table 3.1: Available radiocarbon dates from Central Sudan**

Site	Radiocarbon age BP	Calibrated age BC	Reference
Um Direiwa I	4950±80 (5280±80)(*) 5600±110 6010±90	3765±120 4165±165 4475±210 4890±110	Haaland. 1981a, 1978 Haaland. 1987a Haaland. 1981a Haaland. 1981a
Um Direiwa II	5000±300	3825±320	Haaland. 1981a
el Ghaba	5020±100 4990±110 5660±120 5660±120	3845±145 3810±150 4540±215 4540±215	Geus in Hassan. 1984 Geus. 1982 Geus. 1982 Geus. 1982
Islang (**)	5870±110	4750±140	Magid 1981
Rabak	4490±100 6050±100 6020±130 5860±80	3245±135 4915±115 4890±145 4750±150	Haaland. 1984 Haaland. 1984 Haaland. 1984 Haaland. 1987a
Shaheinab	5445±380 5060±450 5260±80 (5650±60) 5360±80 (5720±80) 5550±90	4315±400 3890±460 4115±150 4520±60 4220±150 4560±80 4440±60	Libby. 1955 Libby. 1955 Haaland. 1979 Haaland. 1987a Haaland. 1979 Haaland. 1987a Haaland. 1987a
Kadero I	5260±90 (5700 ±100) 5030±70 (5460±70) 5280±70 5500±70 5610±55 5380±65	4115±155 4555±85 3855±130 4380±50 4137±155 4350±190 4475±190 4245±140	Krzyżaniak. 1982 Haaland. 1987a Krzyżaniak. 1982 Haaland. 1987a Krzyżaniak. 1982 Krzyżaniak. 1982 Krzyżaniak. 1982 Krzyżaniak. 1982

Kadero II	5360±60 5670±60	4220±140 4535±55	Haaland. 1987a Haaland. 1987a
Zakiab	5360±90 (5660±80) 5660±80 (5970±80)	4220±160 4530±70 4540±200 4850±160	Haaland. 1978 Haaland. 1987a Haaland. 1987a Haaland. 1987a
Nofalab	5290±100 5520±130	4145±160 4390±220	Magid. 1981 Magid. 1981
Jebel Tomat	4140±100	?	Magid 1988
Shaqadud Midden	5584±195	4460±195	Marks. 1984
Shaqadud Cave	4059±65 4123±86 3615±88 4046±101	2675±120 2755±135 2095±155 2656±145	Marks. 1984 Marks. 1984 Marks. 1984 Marks. 1984
el Kadada	4630±80 4830±50 5170±110 4790±110 4370±80	3390±120 3625±100 4015±150 3580±140 4507±120	Geus. 1981 Geus. 1981 Geus. 1981 Geus. 1981 Geus in Hassan. 1984
Geili	5570±100		Caneva. 1988
Es-Sour	5296±48  5330±54 5180±48	4230BC-4190BC & 4180BC-4040BC 4240BC-4050BC 4045BC-3955BC	Sadig 2008a

(\*) See also Haaland's earlier publication (1978)

(\*\*) Mohammed-Ali and Magid mentions that the date from Islang was obtained from the Mesolithic level just below the Neolithic one. This would give the Neolithic component from Islang a post-5800 BP date (Mohammed-Ali and Magid. 1988: 65)

## Lower Nubia

The internal relative chronology of the Neolithic in Lower Nubia (Abka and Khartoum Variant) is largely derived from technological and typological comparisons of pottery and lithic artifacts from assemblages in the Second Cataract area, where most of the relevant sites lack clear stratigraphic data (Shiner. 1968a: 611ff). For example, the analysis of a few potsherds of a type normally associated with Abkan industry in the CPE Khartoum Variant site (2016) led Shiner (Shiner. 1968a: 629; 1968b: 778) to suggest that the two industries were contemporary and “*in, at least, occasional contact*”. On the other hand, Nordström (1972: 17) suggests that the Abkan industry received its ceramic

traits from the latter phase of Khartoum Variant. The main site in the Abka area (No ix) comprised several occupation levels, with Khartoum Variant material at the bottom of the stratigraphic sequence; the various strata overlying the Khartoum Variant made up the Abkan sequence.

The evidence mentioned above does not necessarily indicate that the two industries were contemporaneous. There is still no direct evidence about the chronological relationship between the Abkan and Khartoum Variant, or between either and the other Neolithic sites in Central Sudan. There is, however, some fairly strong indirect evidence (supported to some extent by C14 dates) that the Abkan occurs after the Khartoum Variant. If we suppose that the Abkan predates the Khartoum Variant, we might end with “*certain traits common to both industries and with the presence of a few sherds associated with the Abkan in Khartoum Variant sites*” (Mohammed-Ali. 1982: 143). Nordström’s assumption suggests that there are ceramic affinities which link the Khartoum Variant with Arkell’s Khartoum Mesolithic, although the characteristic features of Khartoum ceramics, wavy line and dotted line, have no representation at the Khartoum Variant sites.

We have only few C14 determinations from Abakan and Khartoum Variant sites (Table 3.2). These could be summarised as follows:

**Table 3.2: Available radiocarbon dates from Lower Nubia**

Industry	Site	Radiocarbon age BP	Calibrated age BC	Reference	OxCal Calibration 95.4%
Khartoum Variant	Diw 5	6540 ± 110	5410±140	Hays. 1984	5666-5306
Khartoum Variant	AS 16-V-19	3685±90	2185±90	Olsson. 1972	2400-1778
Khartoum Variant	Soleb, 12	6195±70	5070±115	Stuckrnath and Ralph. 1965	5315-4964
Khartoum Variant	Soleb, 13	6125±70	5005±90	Stuckrnath and Ralph. 1965	5287-4848
Abkan	IX,L4	4500±350	3230±360	Crane and Griffith. 1960	4041-2234
Abkan	IX,L4	4470±300	3190±320	Stuckrnath and Ralph. 1965	3946-2351

Abkan	IX,L5	5960±400	4830±400	Stuckrnath and Ralph. 1965	5666-3995
Abkan	IX, L5	5960 ± 400	4014±400	Myers. 1960	5666-3995
Abkan	AS-16-S-10	5730 ± 160	3760±160	Myers. 1960: 250	
Abkan	AS-16-S-10		3640±115	Myers. 1960: 250	
Abkan	AS-16-S-10	5330 ± 80	3380±80	Myers. 1960: 250	
Abkan	AS-16-S-10		3310±80	Myers. 1960: 250	
Abkan	11-1-16	4935±130	3940-3630	Carlson. 1966	4033-3377

From this table it appears that:

- a. Excluding the dates from site AS 16-V-19, the Khartoum Variant industry belongs to the 6<sup>th</sup> millennium BC, or survives into it.
- b. The Abkan industry belongs to a part of the 5<sup>th</sup> millennium BC and survived during the 4<sup>th</sup> millennium BC.
- c. The earliest date of Khartoum Variant sites, ca. 5400, is earlier than any other date from the Neolithic sites in Central Sudan.
- d. The oldest dates of Abka site, excluding the one from site 11-1-16, correspond the oldest dates from Kadruka 13 and 21, and R12 cemeteries (see below).
- e. The chronology of Abkan and Khartoum Variant covers the entire 5<sup>th</sup> millennium BC. Unfortunately, no cemetery has been excavated, and the few and poorly published investigated settlements (Myers. 1958; 1960, Shiner. 1968b, Carlson. 1966, Nordström. 1972) can provide only a pale image of these cultures.
- f. One of the main problems in Lower Nubian sequence is the labeling of certain sites with different terminologies. This is the case with the two sites DW4 and DW5 attributed to so - called Post-Shamarkian. The two sites each consist of large concentrations, measuring some 250 x 50 metres in area but very shallow in depth, made up mainly of chert and quartz debitage but also including an element of Egyptian flint. The sites have yielded two radiocarbon dates: 5600±120BP (4475±270BC) and 5220±50BP (Hassan. 1986, Nordström. 1972: 8). According to Nordström (1972: 96), the Post-Shamarkian “*should be regarded as a local counterpart to the Khartoum Variant and the Abkan, which both display a much wider geographical distribution*”.

## Upper Nubia

The excavations of the Neolithic cemeteries at Kadruka, R12, and El Multaga added valuable information to the typology of the early and late Neolithic remains, their absolute chronology and burial customs. The known dates and their calibrations are presented in Table 3.3.

**Table 3.3: Available radiocarbon dates from Neolithic sites in Dongola Reach**

Site	Radiocarbon age BP	Calibrated age BC	OxCal Calibration 95.4%
Kadruka 13	5810±60	4720-4580	4798-4505
Kadruka 13	5990±60	4950-4780	5021-4726
Kadruka 21	5910±60	4850-4710	4945-4617
Kadruka 21	5850±70	4800-4610	4897-4540
Kadruka 1/131	5360±70	4330-4040	4341-4003
Kadruka 1	5290±80	4170-3990	4326-3968
R12 Gr. 18	5910±50	4810-4710	4933-4688
R12 Gr.33	5860±80	4810-4600	4935-4536
R12 Gr. 111	5620±80	4540-4350	4681-4334
R12 Gr. 107	5570±60	4460-4350	4532-4331
Multaga 18/1/1	5640±40	4530-4390	4546-4365
Multaga 13/10	5480±35	4355-4255	4444-4257

Some pottery sherds from the oldest graves at the R12 cemetery in the Northern Dongola Reach (Salvatori and Usai. 2008: 33-38), are typically the same as some sherds mentioned in Nordström's description of Abka pottery. This cemetery also produced few but very characteristic cortex scarpers, typical of the Abkan lithic complex (Salvatori and Usai. 2007: 325). Pottery similar to that found in the older graves at this cemetery is recorded in Letti basin (Usai. 1998: 419). The presence of similar cultural traits all along this part of the Middle Nile valley is clear when the pottery remains found in the Multaga graves, in the Southern Dongola Reach, in the most recent graves at R12 and in the graves of Kadruka 1 cemetery in the Kerma Basin are considered. Although there are now numerous age determinations on the Neolithic sites of this part of the Middle Nile region, the determinations number is still hardly enough to develop a detailed, firm chronological framework. However, the dates from Multaga, R12 and Kadruka 1 are sufficient to present a general chronological framework of the Neolithic period in this part of the Middle Nile region (Table 3.4).

**Table 3.4: Available radiocarbon dates from Pre-Kerma sites**

Site	Radiocarbon age BP	Calibrated age BC	OxCal Calibration 95.4%
Kerma Site 1	4400±55	3100-2910	2888-2581
Kerma Site 1	4345±55	3030-2900	3322-2887
Kerma Site 27	4345±65	3030-2880	3327-2875
Kerma Site 21	4085±50	2700-2560	2869-2488

## Central Sudan: Post-Neolithic Hiatus?

There are no sites in the Khartoum area that yield a C14 date after *ca.* 3800 BC. There are a few dates from el Kadada in Shendi area and further south from Rabak and Jebel Tomat; they all fall in the period between *ca.* 3250 to 3390 BC. There are also some surface sites discovered along the Begrawiya-Atbara road survey which contain some material stylistically similar to the 3<sup>rd</sup> millennium pottery at Shaqadud (Mallinson *et al.* 1996). These sites need detailed study and their existence provides opportunities for future investigation into the cultural history of Central Sudan. The time span of the Neolithic of all the sites situated along the Nile from Shendi to Rabak extends to the beginning of the 4<sup>th</sup> millennium BC. Most settlement sites in Central Sudan were probably terminated between 3000 – 2090 BC except the site of Shaqadud (A) which was inhabited until *ca.* 1615 BC. From this time up to the establishment of the Kushite state, about *ca.* 1000 BC, there is apparently a gap in the late prehistoric occupation of riverine Central Sudan. Different theories and explanations have been suggested to explain this gap. None of these theories are persuasive (Mohammed-Ali. 1986, Sadig. 1999).

The deteriorating climate has often been suggested as one of the factors which might have encouraged groups to move further south, or east, into areas with higher rainfall. Based on the material recovered from Neolithic sites in Khartoum and White Nile, Haaland argues that the inhabitants of the first area migrated south because of climatic deterioration (Haaland. 1981a), but this was not supported by Paleo-botanical investigations (Wickens. 1982). Haaland states that: *one difficulty with my hypothesis that climatic change was the major factor in the apparent development depopulation of Khartoum area, was that the area was reoccupied almost 2,500 years later. This is during the so-called Meroitic period, while there was no botanical evidence showing climatic improvement.* (Haaland. 1984: 41-42).

Wickens (1982) evaluated evidence for paleoecological change. Geological archaeological and biological data suggest that there have been significant climatic and ecological changes in the Sudan during the past 40,000 years. The main paleoclimatic

conclusions for the late Neolithic period indicate a wet phase; labeled in Wickens' phases as phase E (6000-3000 BP). Wickens states that "*the climatic decline is not supported by paleobotanical investigations*"

Conclusions based on radiocarbon dating of shells indicate that White Nile levels were high around 3000-2700, and 2000-1500 BP (Adamson *etal.* 1980). During the last 8,000 years, the White Nile has apparently incised some 2 m in response to down-cutting by the Blue Nile and the main River Nile (Williams and Adamson. 1980). Fish bones and *Pila* shells at the Jebel et Tomat prehistoric site confirm seasonally swamplier conditions than those of today between 2000 and 1500 BP. *Lanistes carinatus* and *Pila wernei* that are characteristic of seasonally fluctuating ponds, lakes, or rivers with a clay bottom, and that only occur in the parts of the acacia tall-grass zone with heavy rainfall amounts similar to those received by Malakal today (840 mm; see Tothill. 1946), have been reported from the Holocene lake beds west of Jebel Awlia, from Tagra (Adamson *etal.* 1974), from other sites along the east bank (Williams. 1968), from much of the Gezira clay (Tothill. 1946), and from north of Khartoum (Ruxton and Berry. 1978).

All these evidences may indicate better environmental conditions for the people along the Nile during the late Neolithic period. It is very difficult, on the base of these evidences, to confirm that environmental pressure may be the main factor in the depopulation of the Central Sudan riverine region.

For a number of reasons, Mohammed-Ali (1986: 83) argues that the Butana could offer a better explanation for why the people along the Nile who were forced to move east due to the environmental pressure and the carrying capacity of the Nile environment.

Today, the Butana falls within the semi-desert zone of north-Central Sudan with very precarious summer rainfall not exceeding 150 mm at best (Whiteman. 1971: 5). The area rarely receives a reasonable amount of rain to the extent that water fills the watercourses and the small depressions for some time. The general rule, however, is the consistency of desert conditions that limit the area's potential for both animals and the sparse semi-nomadic population (El Amin. 1992: 47). Along the main wadis and water courses a number of Acacia species, shrubs and seasonal short grasses grow that provide grazing for animals. According to Peters (1989: 469) the faunal remains from the upper layers of the midden site (Khartoum Neolithic) suggests a rather humid grass savanna with standing trees requiring an annual rainfall of some 450-500 mm (Peters. 1989: 469). The faunal remains collected from the cave layers suggest a shift to somewhat drier savanna conditions with an average rainfall of about 350 mm (Peters. 1989: 470).

What Mohamed-Alis' calls carrying capacity means "*the number of individuals that the resources of a habitat can support*". The question is how to evaluate the carrying capacity? The definition implies that the region experienced a decline in biotic potential due to several

environmental constraints, like the increased pressure on pastoral system. This argument necessitates finding evidence of the real carrying capacity of the Nile environment at that time and evidence of the environmental factors that may have caused a depopulation of the area, or at a later date destroyed the settlements (Mohammed-Ali. 1986: 83).

In support of Mohammed-Alis' explanation, Caneva (1997) believes that chronological information recovered from the site of Shaqadud, is to some extent, able to fill the "chronological gap" between the latest Neolithic evidence and the beginning of the Kushite period (Caneva. 1994: 75).

There is little evidence from Shaqadud to support these explanations but not in the full meaning of the regional explanation. Shaqadud contains settlement debris dating from Mesolithic to the full development of the Neolithic, therefore lasting in total about 4,000 years between 7417 BP – 3615 BP (ca. 5467 BC–1665 BC) (Mohammed-Ali. 1986). This is not a Post-Neolithic development but a Neolithic one.

Reinold and Krzyczaniak (1997: 13) argue that the discontinuity is probably due to the shift to nomadic pastoral agriculture, which leaves little in the way of archaeological remains. The nomadic pastoral system may be a very important factor in the discontinuity but it is not the only reason. It is possible that, by the late Neolithic, "settlement" could have been quite mobile, moving between riverine areas and their hinterlands (Butana, Gezira), exploiting a wide range of resources. Following this model, the most significant change during this period is the apparent disappearance of large and rich sites such as Kadero I and el Kadada.

Elsewhere, Haaland argues for continuity through a change in settlement pattern associated with economic process. This explanation is plausible against the background of Haaland's comparative ethnographical material (Haaland. 1984). This economic development had its roots in Early Neolithic, and its effect was evident in the archaeological record. The introduction of domestic animals to Central Sudan during the Neolithic period must have affected aspects of the life of the inhabitants. Current knowledge of the chronology and the relations between Sudanese and Saharan areas suggest that domestic stock were introduced from the Sahara as the land became drier. Cattle, sheep, and goats appear by the 6<sup>th</sup> millennium BP. Local assemblages of lithics and ceramics show continuity, indicating that any movement of Saharans into the region was a small- scale, and culture contact had a greater effect on socioeconomic change than migration did. Clusters of particularly rich graves of men, women, and children at Kadero I suggest differences in wealth, but there is no evidence of social stratification. Pastoral intensification and a decrease in wild animal use are also evident at some sites in the Middle Nile from after 5300 BP. Despite these developments, the spread of herding



was patchy: at Shaqadud, east of the Nile, subsistence still focused on wild resources as late as 4000 BP.

Nevertheless, whatever this social organisation might have been like, it should have left some material manifestations of its structure. The increasing importance of domesticated animals, for example, would be associated with the emergence of more individualised rights and responsibilities in economic management and this would have led to an increase in social differentiation within such communities. The important issue is the organisation of such chiefdoms. Comparative ethnographic material indicates that chiefdom is based typically on nuclear families or small extended families of limited span and that it is thus associated with private property. In addition, chiefdoms are based on the concept of hereditary inequality: differential status is ascribed at birth (Wenke. 1980: 342-343). Chiefs frequently have a divine status; their families have privileged access to material resources, food, foreign goods and so on.

It seems that, in spite of evidence from many excavated sites, evidence of social organisation of the people of the Neolithic in Central Sudan is limited to that derived from burial information. Although the hypothetical social classes reflected by graves were not observed in the settlements, currently available evidence seems to indicate that the burial grounds at el Kadada and Kadero I illustrate the process of the increasing concentration of goods and power among a social “elite”- that arose toward the end of the Neolithic (Geus. 1984a, Krzyżaniak. 1992a, 1992b).

It is clear that the social structure in Central Sudan during the Neolithic period exhibited more or less inseparable economic and settlement patterns which are in turn, witness to developmental stages extending from the Early Neolithic to the complex picture of the Late Neolithic.

Although the degree of permanence varies from one site to another, reaching its zenith at Kadero I and el Kadada, all exhibit a mobile pattern, which started to show a regular schedule of movement through the different microenvironments in later times. Another question is the relation between settlement patterns and social and ethnic affiliation during the Neolithic. Certainly, much can be learned about the various subsistence patterns of different “archaeological groups” but it is not possible, in the Neolithic period, to go beyond this and attach linguistic or ethnic labels to archaeological cultures. It is doubtful whether much can be learned about ethnic identity in the absence of written information. The question is, why haven’t archaeologists found any signs of this system for about two hundred years after the end of the Neolithic period? Is this due to the fact that this system leaves little as archaeological remains, or is it due to the lack of research?

Shinnie (1984: 110) investigated the Butana as a preferred region for prehistoric people and stated that, “*after the important development that the Neolithic sites demonstrate, there*

*was little change – a basically agricultural and perhaps trans-humant society growing sorghum and raising cattle and living in small villages with a technology dependent on stone tools and making much pottery, occupied the area until, probably under outside stimulus, the originally copper, and later iron, using society responsible for the development of Meroitic culture developed and rapidly spread along the river and into the Butana.”*

The use of terms such as “trans-humant” and “outside stimulus” is the main weakness of this explanation. Does the “little change” reflect development through a new innovation within a continuing group of people? Does the “trans-humant society” indicate immigration of people of different cultures, replacing the original inhabitants? When did all this happen? Where can we find these “small villages” and their remains? How can we recognise such “outside stimulus”? In spite of the knowledge we have acquired to date, all these questions remain unanswered. Some major archaeological investigations have been undertaken at sites further north (some are still ongoing), in the Dongola Region and in neighboring regions (e.g. Fourth Cataract and Wadi Howar), but the movement of people is still unexplained. From all the above, it is difficult to find evidence for these claims unless serious research is undertaken to trace the movement of the Nile inhabitants to the hypothesised area suggested by Shinnie.

Haaland (1987a) also suggests that migration of a pastoral “linguistic” group (Afro-Asiatic “Cushitic” speaking people) into the area could have caused the change in the settlement patterns. Although this process is consistent with linguistic distributions, it is difficult to find direct archaeological evidence for such a movement.

## **Discussion**

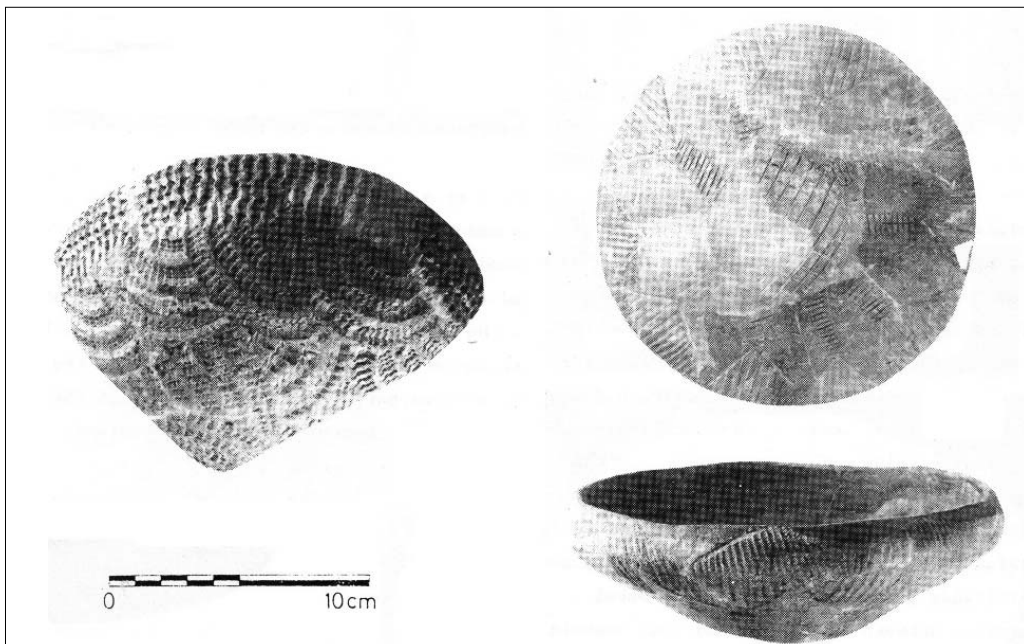
The chronological sequence of the Neolithic period had been build up in accordance with certain radiocarbon dates in certain areas. The comparative approach has not been applied for finding reasons for the development experienced by northern Sudan through its long history, or why Central Sudan remained isolated from such development since the end of the Neolithic period. Though this comparative study may be theoretical in its appearance, it may contribute to identifying the factors behind the unique development in northern Sudan; Central Sudan was not necessarily lacking the economic motives present in northern Sudan, because it experienced recognisable technological and economical development during the later prehistory.

The researchers of the prehistoric period in Central Sudan, during their constant research for the reasons for the general discontinuation which covered greater part of Central Sudan, need to concentrate their research on the sites that exhibited a long chronological sequence (for example Jebel Moya). The great value of these sites is to determine whether those people or these cultures derived from a local sequence, by assuming that all the people of a given period belonged to a single cultural group or, if it is obvious that they did not, separating them into two or more groups by the process

of cultural classification. For all these reasons, sites dating to the end of the Neolithic period itself must be found. The search for sites belonging to post-Neolithic may be unimportant unless we know the reasons that lead to the sudden disappearance of the Neolithic sites. In other words, research into the continuity cannot be confined to a study of the distribution of the archaeological inventory on a single site or within a local area, but has to take into consideration the distribution of the material from a much larger framework of time and space.

The evidence from el Kadada shows that small amount of material are compared to Late Neolithic finds further north, including in Late A-group contexts around 3000 BC. These finds include some distinctive decorated bowls very similar to examples found in the A-Group Royal cemetery at Qustul (Geus. 1984a Plate 12; Williams. 1986, Figure 34) (Plate 3.1). The archaeological materials include a number of circular or subcircular grave shafts, super imposed burials, and a large quantity of grave goods inside the shafts. Undecorated sherds, related mainly to quite coarse, black-topped red wares, were found in the Neolithic site of es-Sour, 15 km north of el Kadada (Sadig. 2005b; 2008a; 2008b). Such black-topped red wares have been found at Shaheinab (Arkell. 1953: Plate 34, see Plate 3.2) and Geili (Caneva. 1988: 110); and are reported to have been quite common at Kadero I, el Kadada; were found among the pottery assemblage of the A-group of Lower Nubia (Nordström. 1972: 88-89) and are consistent with the relatively late C-14 date obtained for the site at es-Sour (Wk23036: 5296±48 BP, Wk23037: 5330±54 BP, Wk23038: 5180±48 BP) (Sadig. 2008a).

**Plate 3.1: Pottery from Kadada display shapes with thick inverted rims, in a fashion known in A - Group of Lower Nubia (source: Geus. 1984a. 71.)**

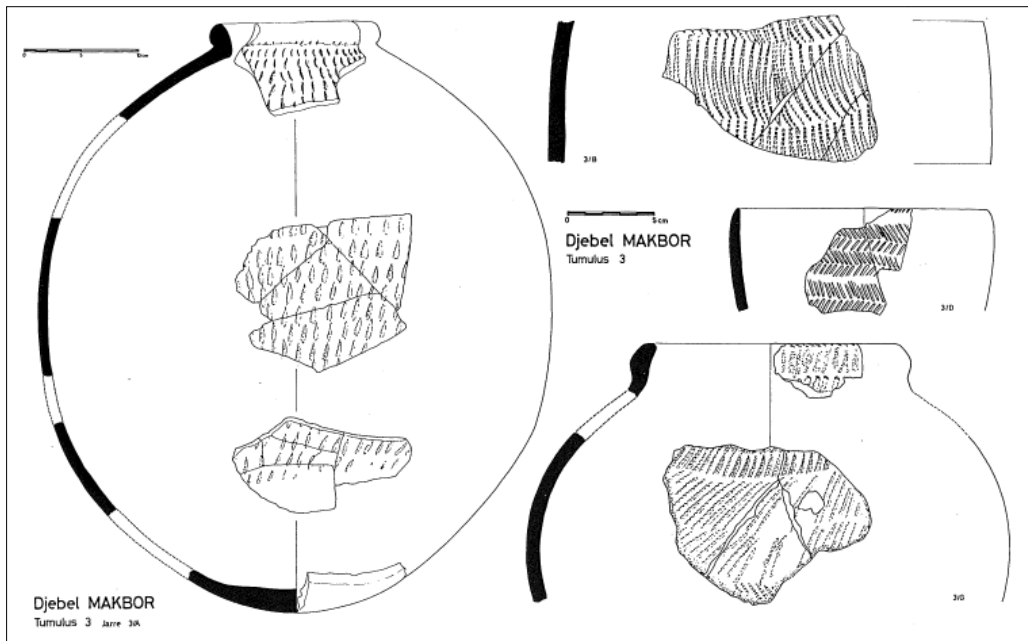


**Plate 3.2: Black-topped sherds from Shaheinab (source: Arkell 1953.)**



Potentially even later material was found in a single burial on the edge of Jebel Makbour, about 5 km away from the river (Lenoble. 1987, Figure 3.2), namely, a contracted burial beneath a stone cairn associated with pottery similar to material of the late third and second millennia BC, from Dongola Reach. This find may point out to an emergence of a different burial custom at the edge of Butana, dating back to the end of the second millennium BC.

**Fig 3.2: Ceramic from Tumuli 3 at Jebel Makbour (source: Lenoble 1987, Fig. 10.)**



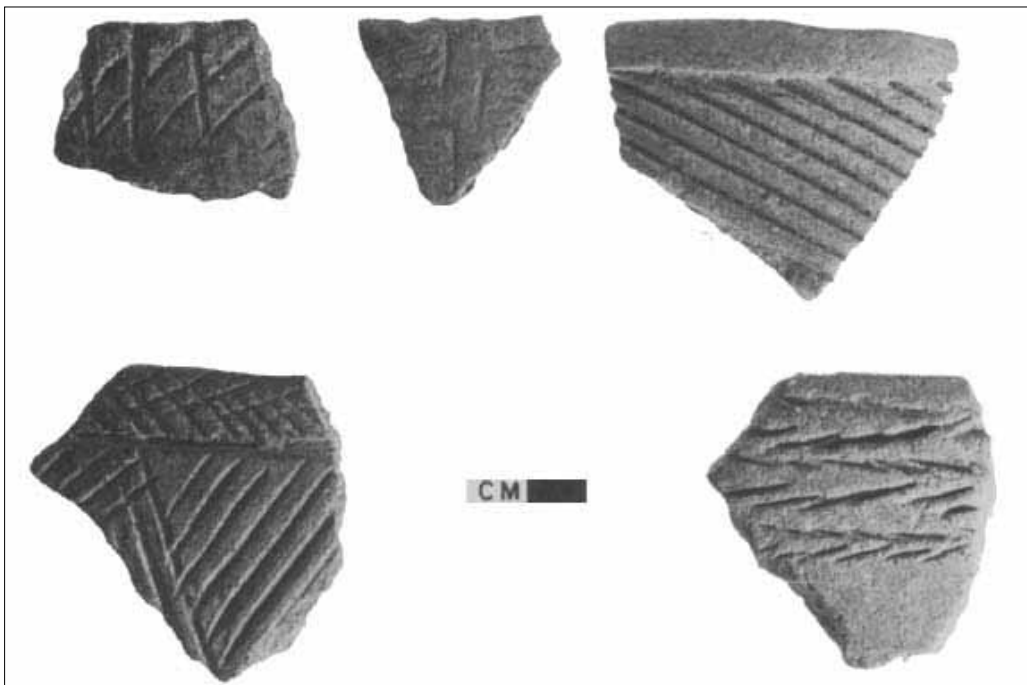
Along the riverine Central Sudan, evidence may indicate that populations lived in the region continuously. Recent finds of tumuli at Umm Singid (Wadi Kanjer, Khartoum North), dated to 3220 BP (1520 BC) (Caneva. 2002 Plate 3.3), and cross-hatched pottery similar to that of the Nubian Pan-grave culture in Northern Sudan and the Mokram group in Eastern Sudan, ancestors of the present-day Beja Cushitic-speakers (Sadr. 1990), appears to provide further support for the existence of population in the Khartoum region during the middle of the second millennium BC.

**Plate 3.3: Umm Singid, Khartoum North: The recent finding in the Khartoum region of Tumuli, dated to 3220 BP (1520 BC) (source: Caneva 2002.)**



The site of Shaqadud in western Butana presents a different panorama. Occupation at the site continues through to c. 2000 BC. Pottery from the site also bears comparison with northern traditions of the 3<sup>rd</sup> millennium BC, with black and red burnished wares and heavily incised decoration. By the 5<sup>th</sup> millennium, the Atabai plains east of the Nile in Eastern Sudan increasingly appear to be culturally distinct from the riverine areas (Mohammed-Ali. 1985: 26). Neolithic sites have been located in this area, contemporary with the last half of what has been designated the Kassala phase, including a group of over fifty sites termed “Jebel Mokram” (Fattovich *etal.* 1984 Plate 3.4). This phase has been generally dated to around the 2<sup>nd</sup> millennium BC and is characterised by seasonal occupation by nomadic groups who moved into the Butana and the Atbai (Mohammed-Ali. 1985, Fattovich. *etal.* 1984: 182).

**Plate 3.4: Typical Jebel Mokram sherds. (source: Fattovich et al. 1984. Figure 6. 183.)**



Evidence from areas south of Khartoum (University of Bergen and University of Khartoum surveys along the White Nile), suggests that there may have been a widespread Late Neolithic occupation along both Niles (White and Blue Niles) and in the adjacent hinterlands. Levels at Rabak site are datable to the 4<sup>th</sup> millennium BC. Links with the interior of Gezira are indicated by the presence of very similar pottery at Jebel Moya, Jebel Tomat and other sites (Haaland. 1984). The occupation at Tomat continued into the 3<sup>rd</sup> millennium BC (later than any Late Neolithic site in the Khartoum-Shendi region). Shells from the site, found at a depth of 60-80 cm, in a soil pit dug by Williams,

yielded a date of  $4,540 \pm 200$  BP (in Clark, 1973: 57). This may be an indication that the settlement may have originated as early as 2000 BC but the date should be treated with caution until it can be verified.

New dating is thought to comprise three main temporal phases at Jebel Moya, between ca. 5000–100 BC. Phase I (ca. 5000–3000 BC) was identified by the presence of diagnostic dotted wavy line pottery; however, the original settlement horizon was said to have been destroyed by the later inhabitants (Gerharz, 1994). Surviving site features, including all graves, date to Phase II (ca. 3000–800 BC) and Phase III (800–100 BC). Gerharz regards Phase II to be a distinctive, heterogeneous culture that combined elements of various outside groups (1994: 330). Pottery motifs, vessel forms, lip-plugs, and stone tools of the Butana Industry (ca. 3rd millennium BC), on the Ethiopian border in the Atbara drainage, mirror those found at Jebel Moya. C-group and Kushite influences in pottery are also evident (Clark, 1973; 1984; Clark and Stemler, 1975). The presence of Kushite (Napatan and Meroitic) graves items was proved. The Jebel Moya complex is characterised by the ceramics which, as a rule, are decorated along the rim portion of the vessel (banded) within impressed or incised designs (Haaland, 1987a: 220). The exterior surfaces of these vessels are usually wiped or smoothed, while burnishing is rare. However, there are few examples of incised ceramics (if any) in the pre-Napatan aspect of the Jebel Moya ceramic complex and there is a total absence of ripple, red-finished, or black-topped ceramics. The fact that these particular kinds of ceramics do not exist in the Jebel Moya complex is probably an indication that the Jebel Moya complex post-dates the Late Neolithic and Post Neolithic developments further to the north, and a post-3000 BC date for the beginning of the Jebel Moya complex would be in line with this assessment. Burnished ceramics which are so common in the Late Neolithic of el Kadada and the sites of the Khartoum Province are not as frequent in the Jebel Moya ceramic complex (however Jebel Tomat may be an exception). Furthermore, wiped surfaces, which do appear in Jebel Moya ceramics, are not common in the Late Neolithic sites further to the north.

Material similar to that found at Rabak has been discovered near Kawa (40 km north of Rabak), and at Soba (30 km south of Khartoum). Surface collection from the White Nile (Dewahia site near Jebel Awlia) (Sadig, 1999), Central and west Gezira (Qoz sites) seem likely to relate to a ‘late’ phase of a Neolithic occupation, and this is confirmed at the sites of Kabarao and Qoz Bakheit (Fernández *et al.* 2003).

## **Conclusion**

The present author proposes that the terms “Shaheinab or Early Khartoum” should be retained merely as labels of a cultural phenomenon. Because the terms are used both as terms for a time period and a cultural phenomenon, it is ultimately confusing. Furthermore, Khartoum Variant is an inappropriate name for the “Neolithic” of part of

Lower Nubia. Firstly, Khartoum Variant chronology is based on generally similar features to the Early Khartoum Mesolithic rather than the Shaheinab Neolithic. In part, this is because Khartoum Variant material is defined on the basis of a limited number of sites and it is difficult to connect it with Shaheinab sites, which are producing considerable samples under conditions of modern stratigraphic excavation. Moreover, the claim that there are ceramic affinities which link the Khartoum Variant with Arkell's Mesolithic is unfounded because the characteristic features of the Khartoum pottery, wavy line and dotted wavy line, have no representation at the Khartoum Variant sites (Mohammed-Ali, 1982: 144).

In this chapter the different chronological terminology was debated, and the author concluded that accepted general terms like Early Khartoum and Shaheinab were acceptable. We use these terms to distinguish sites that characterise the Mesolithic and Neolithic periods. These terms should not be applied to all cases, however, since sites distinguished by local variations should not be forced into the general classificatory categories. The material culture of the Neolithic and Mesolithic sites suggests they belong to different chronological periods. The absolute dates deduced from different sites prove that the sites differ chronologically as well as regarding aspects of the material culture. Some sites contain typical Shaheinab material, e.g. gouges, and others do not. For example, the site of Rabak is recognised as a typically Shaheinab site although it lacks gouges (Haaland, 1987a). Geili, with rhyolite gouges and incised ware corresponds to the Shaheinab assemblages and could be close to it chronologically. From this explanation, it is clear that three types of Neolithic "variants" exist. They share some Neolithic traits with typically Shaheinab sites but they also lack some of the main traits of that site (Figure 3.3). The four variants are as follows:

- a. Shaheinab type-sites: contain typical Shaheinab material, especially the gouges (Geili, Nofalab and Kadero I).
- b. The second variant shares some traits with Shaheinab but lacks the gouges (Rabak, Jebel Tomat and Jebel Moya).
- c. The third variant is found at sites like el Kadada, where the site is partly contemporary with the late period of other two assemblages, but also reflects a higher development in material culture than the other two do (Es-Sour).
- d. The fourth variant is found in Jebel Moya (Phase II) and Jebel Tomat.



Fig 3.3: Cultural chronology for Nubia and Central Sudan (modified from Salvatori and Usai 2008)

Chronology	Upper Nubia	Central Sudan	Lower Nubia
8000 BC 6000 BC	Mesolithic (El Barga)	Mesolithic (Khartoum Hospital, Saggai, etc.)	Qadan ?
6000 BC 5500 BC	Early Neolithic (El Barga)	Late Mesolithic (Kabbashi, etc.)	Khartoum Variant (DW5, Soleb, 12, 13, ) Abka AS-16-S-10, 1-1-16
5500 BC 5000 BC	?		
5000 BC 4500 BC	Middle Neolithic A (Kadruka 13-21, R12) El-Barga Settlement	Early Neolithic (Shaheinab, El Ghaba, Kadero, etc.)	?
4500 BC 4000 BC	Middle Neolithic B (Kadruka 1, R12, Multaga)		
4000 BC 3500 BC	?		
3500 BC 2600 BC	Pre-Kerma	Late Neolithic (El Kadada, es-Sour)	A-Group (Afiyeh 1 Afiyeh 7, 158, Classic, Terminal
2600 BC 1500 BC	Kerma	Jebel Tomat, Jebel Makbour, Umm Singid	? C-Group

JM. Phases I—Jebel Moya: (Phase I)

The assumption is that in the late 2nd millennium BC (early 1st millennium BC) much archaeological date is lacking because people in this region were quite mobile. But even if this is the case, the inhabitants must be buried somewhere. Therefore, to confirm their existence, their graves need to be identified as it will be much more difficult to find materially-poor sites of “mobile” pastoralists. All the analysis and new collections, including important data from the sites of Singid and Jebel Makbour, underscore how much excavation still remains to be done to fill in the sizable gap that exists in the archaeological record of Central Sudan. Much of what is known about the early history of this region is based on dates gained from only a few excavated sites; Singid, Jebel Makbour, and Jebel Moya represent only three scattered data points on vast and largely different landscapes. Much research remains to be done to fill the gap between these sites and the first appearance of the Kushite people in Central Sudan. There is a need for a new survey in Shendi-Meroe region to find new sites. Hardly any surveying has been done in this region. The recent discovery of the Neolithic site of es-Sour is a good example of the lack of systematic surveys in this region. The site of Meroe has seen much archaeological interest since the beginning of the 20th century, mainly focused on its Kushite and post-Meroitic remains. However, relatively few systematic surveys have been carried out in the surrounding region. For this and other reasons, the Department of Archaeology, University of Khartoum, initiated a new survey project concerned with sites of all periods in the region to the north of Meroe, extending as far as Mutmar. Survey and test excavations were begun within a concession held by the Department and directed by Ali Osman during 2004 and by the author during January-February 2005 (Sadig, 2005b).

In Lower Nubia, the Abkan Neolithic is followed by the so-called A-group culture that, according to C-14 determination can be dated to the mid 4<sup>th</sup> and mid 3<sup>rd</sup> millennium BC (Table 3.5). Evidence related to the so-called A-group Culture is located along the Nile River between Kubbaniya, north of Aswan, and Melik en Nassir, south of the Second Cataract (Nordström, 1972). Among the main areas, substantial differences in the archaeological remains were noticed. The differences can be summarised as follows: typology of the shafts of tombs; pottery; evidence associated with the burials; and other materials included in the grave goods.

**Table 3.5: Available radiocarbon dates from A-group**

Site	Radiocarbon age BP	Calibrated age BC	OxCal Calibration 95.4%
Afiyeh 1	4660±100	3550-3340	3645-3101
Afiyeh 7,158	4290±120	3100-2670	3336-2579
Afiyeh 7,157	4380±115	3120-2880	3483-2695
Classic A-Group	4655±80	3530-3350	3639-3112
Terminal A-Group	4555±75	3370-3100	3518-3023
Terminal A-Group	4440±90	3330-2920	3356-2909
Terminal A-Group	4160±55	2880-2660	2888-2581

The C-14 dates from Multaga, R12 and Kadruka 1 contribute to establish a Neolithic phase to the second half of the 5<sup>th</sup> millennium BC. According to Salvatori (2008: 143) it is possible to recognise the following Neolithic sequence in Upper Nubia (see Figure 3.3):

- a. An early Neolithic phase in the cultural sequence of Upper Nubia starting around 6000 BC. Unfortunately, the el-Barga Early Neolithic actually covers only the first half of the 6<sup>th</sup> millennium BC and a gap of almost 500 years separates it from the Middle Neolithic A at Kadruka cemetery and el-Barga settlement.
- b. The 5<sup>th</sup> millennium BC is well represented by some of the graves at Kadruka and el-Multaga.

Almost nothing is known about Upper Nubian cultures during most of the 4<sup>th</sup> millennium BC. The 4<sup>th</sup> millennium BC refers to the beginning of the so-called Pre-Kerma period discovered in Kerma region. Chronologically, the Pre-Kerma period lies between the end of the 4<sup>th</sup> and the beginning of the 3<sup>rd</sup> millennium. The Pre-Kerma period is c14 dated between the end of the 4<sup>th</sup> millennium and the beginning of the 3<sup>rd</sup> millennium BC (see Figure 3.3).

## 4

# Neolithic Subsistence Patterns

Many scholars have attributed animal domestication to humankind's ingenuity, and assert that it occurred in a coordinated and premeditated fashion (Isaac. 1962). Other researchers have argued that animal domestication was a natural consequence of the ecological and human demographic transitions which took place at the end of the last glaciation, at approximately 12,000 BP. This viewpoint includes Childe's *oasis* or *propinquity* theory, which contends that the encroaching desert in southwest Asia resulted in humans and animals competing for water resources and that this ecological pressure fundamentally altered their interrelationship and eventually "led to animal domestication" (Childe. 1952).

Binford (1972) takes another approach to the origins of domestication and agriculture. His *edge-zone* hypothesis is based on culture as an adaptive device. He assumes that, as human populations expanded in the Fertile Crescent, different groups impinged on each other, encouraging the development of new systems for more efficient resource-utilisation, i.e. plant and animal domestication.

Although there is still no consensus concerning the precise changes in human behavior and ecology which gave rise to sedentary agriculture and animal husbandry, the evidence is overwhelming that the primary trigger was climatic. Recent evidence has confirmed that the 12 millennia since the end of the last glaciation have been the most stable climatically.

## Faunal Remains and Evidence of Animal Husbandry

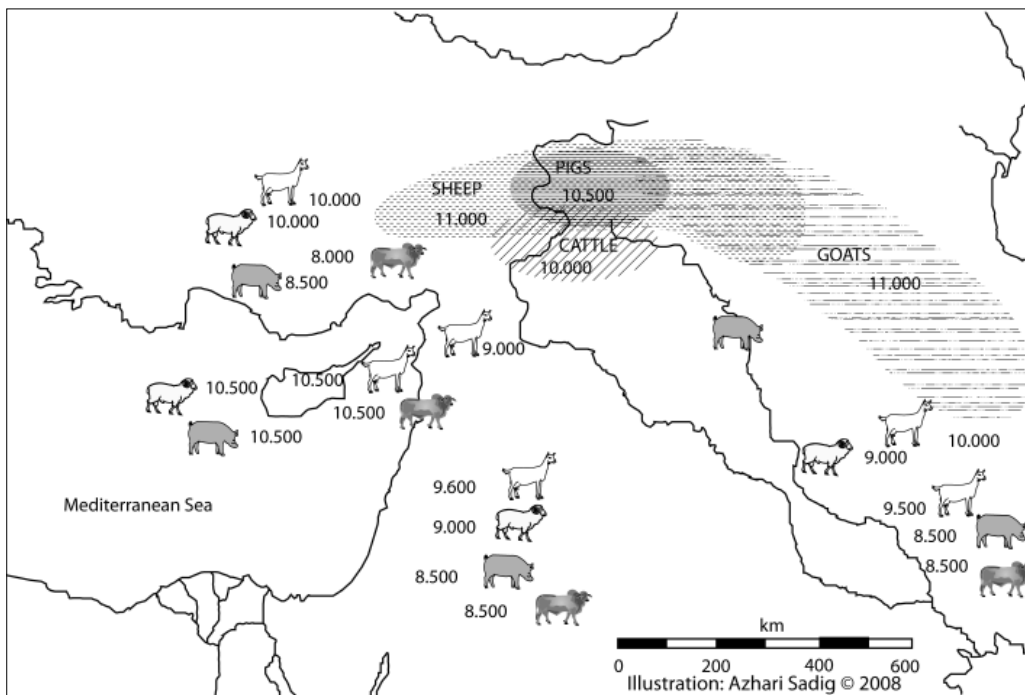
### **First evidence**

The oldest evidence for animal domestication appears in archaeological sites of the Natufian period, a Mesolithic culture of the Levant (*ca.* 12,000-10,000 BP) (Isaac. 1962; Meadow. 1989). During this period a symbiotic relationship developed between humans and the wolf (*Canis lupus*), which gave rise to the domesticated dog (*Canis familiaris*). The earliest site where skeletal material from domesticated dogs has been recovered is at the Upper Paleolithic cave of Palegawra in present-day Iraq, which dates to approximately 12,000 BP (Whitehouse. 1983).

The next stage in the Neolithic transition was a marked change in the dominant food source of certain ancient Middle Eastern Neolithic cultures, from a reliance on gazelle and deer to *ovicaprids* (sheep and goats). This can be detected as *faunal shifts* which occurred in the Middle East between 10,000-8,000 BP (Davis. 1982). After this period sheep and goat remains became the most common faunal remains at the majority of ancient human settlements in southwest Asia.

The last major species in southwest Asia to be domesticated were cattle and pigs. This seems to have taken place during the 9th millennium BP in a number of ancient human settlements scattered across the Middle East and the Levant (Davis. 1982, see Map 4.1).

**Map 4.1: Map of southwest Asia, showing the earliest dates of domestic animals**



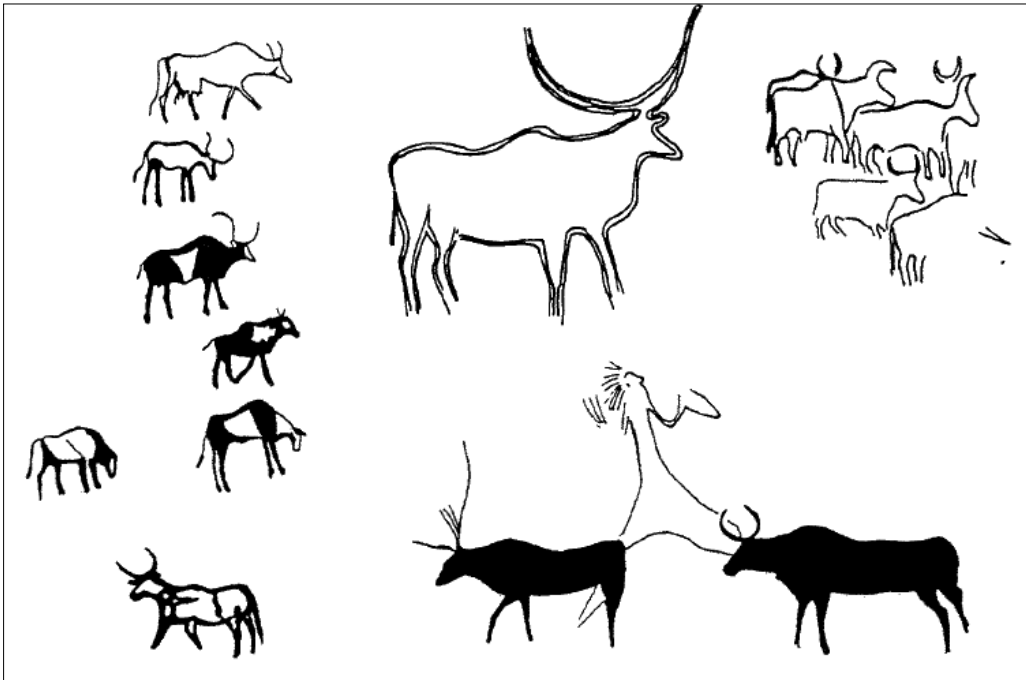
In Africa, the first authenticated domesticated cattle appeared in the early Neolithic settlements of the Nile Valley about 6,800 BP e.g. Fayum (Wendorf and Schild. 1976). These longhorn cattle dispersed with Hamitic peoples; south through present-day Sudan, west along the northern coastal region, southwest into West Africa and also centrally through a much-reduced Saharan region. Cave art from the Tassili and Tibesti highlands indicate that, at this time, cattle were present in regions of the Sahara which has practically no rainfall today (Plate 4.1).

**Plate 4.1: Rock painting of a pastoral scene, Tassili, southeast Algeria (source: Phillipson 2005.)**



Although there was an indigenous African aurochs, *Bos primigenius opisthonomus*, it is widely accepted that this subspecies was not domesticated independently (Figure 4.1) (Epstein. 1971; Epstein and Mason. 1984; Payne. 1991). There has been some speculation in the literature that this native African aurochs actually formed or contributed to the early domesticated populations on the continent (for reviews see Grigson. 1991; Wendorf and Schild. 1994).

**Fig 4.1:** Rock paintings from Tassili n'Ajjer in southwest Algeria showing putative domesticated cattle and a human figure, possibly a herder (reproduced from Grigson, 1991).



### African Evidence

In Africa, the question of food production is one of the most important issues facing prehistoric archaeologists. These questions generally concern the origin of domestic species of plants and animals and the role played by Africa's late prehistoric populations in the domestication of wild species.

Two schools of thought applied their models to the study of early food production in northeast Africa. The first believes that the area detained knowledge of plant cultivation and animal husbandry from southwest Asia before these domesticates spread to the rest of the continent. The Nile Valley and, occasionally, the Horn and Ethiopia, were suggested as possible routes for the diffusion of these ideas. Mohammed-Ali (1984: 65-66) summarised both opinions. For the former, the argument is as follows:

- a. Sites in southwest Asia which predate sites in Africa show evidence of food production.
- b. The oldest domestic plants and animals (wheat, sheep and goats) recovered from northeast African sites (Fayum, Merimde, Shaheinab etc) pointed to a southwest Asian origin, since no local wild ancestors of these animals have been identified.

- c. Farming in temperate African zones is believed to predate that of tropical Africa.
- d. Until recently no settlements with evidence of food production contemporary to, or earlier than, the earlier settlement of the Nile had been discovered in Africa.

The second school of thought supports indigenous African domestication of sub-tropical plants and animals independent of, and contemporary with, the southwest Asian complex. This belief is due to a number of factors (Mohammed-Ali. 1984: 65-66):

- a. Increasing evidence, supported by radiocarbon dates, suggests that Africa experienced a stage of intensive plant exploitation (a necessary prerequisite, it is agreed, for food production) as early as, or even earlier than, equivalent intensive exploitation in southwest Asia.
- b. Recent botanical work has confirmed that present-day African domesticated tropical cereals (sorghum, pennisetum etc) are indigenous to Africa, and that their wild forms were unknown to southwest Asia.
- c. There is sufficient evidence, supported by radiocarbon dates, that at least two of the so-called Neolithic innovations (pottery and ground stone tools) were known in the Sahara prior to their introduction into northeast Africa.
- d. Wild cattle (*Bos primigenius*) were found widespread in North Africa and the possibility of local domestication could not, therefore, be ruled out.

Without a detailed discussion of the evidence presented by these two schools of thought, it is obvious that either domestic animals or plants were introduced to Sudan from outside or indigenous domestication took place in the Sudan.

With regard to the second argument, it has always been thought that the major domestic animals (i.e. sheep and goats) could not have been domesticated locally because no wild ancestors of these species are known to have existed in the area in pre-Neolithic times. It is thought that these species were introduced to the Sudan from the north, namely from the Egyptian Nile Valley and the Sahara, where they are known to have occurred at an earlier date than the Neolithic of the Sudan; then only are they thought to have been developed by the Sudanese food-gatherers (Krzyzaniak. 1978: 169-170). This argument rejects part of the evidence of the first school, which points out that no early settlements with evidence of food production have been discovered in Africa. The second argument could be modified by postulating that if the domestic species were introduced from southwest Asia, they must first have occurred in the Nile before dispersing to the rest of the continent.

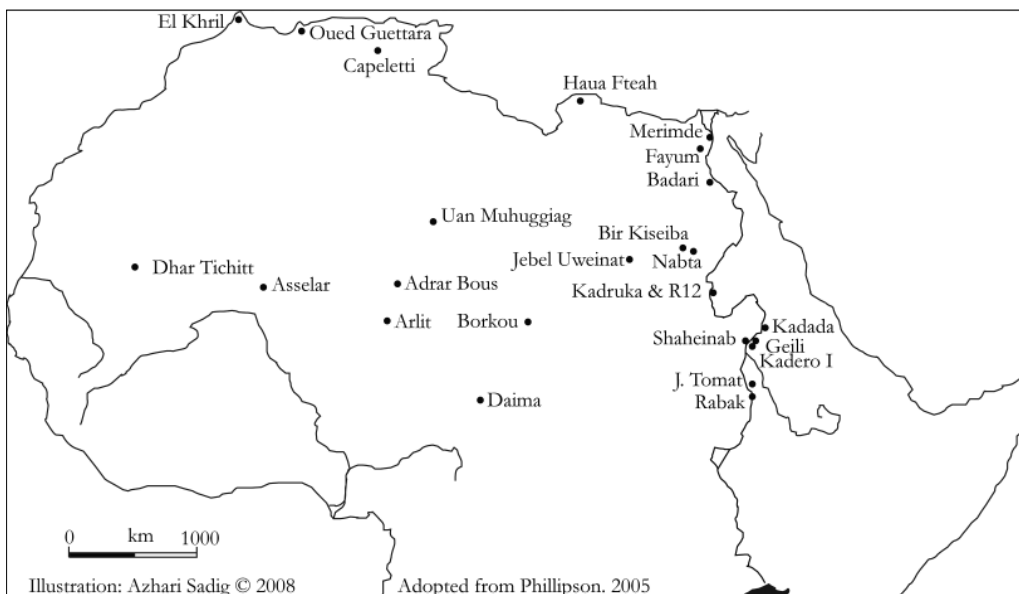


## Archaeological and Botanical Evidence

Of the three major domesticated ruminant species in Africa, only cattle had a wild ancestor present on the continent during the period when domesticated livestock first appeared in the archaeological records (Epstein, 1971). A number of scholars have presented archaeological evidence that cattle were domesticated independently in northern Africa (Carter and Clark, 1976; Gautier, 1984a; 1987a; 1987b; Grigson, 1991; Wendorf and Schild, 1994).

The oldest securely identified remains of domesticated cattle in Africa were discovered in North Africa in Capéletti in Algeria and this find gave radiocarbon date of  $6,530 \pm 250$  BP (Clutton-Brock, 1989). Another site, which revealed putative domesticates, is Adrar Bous in northern Niger. These remains were dated to  $5,760 \pm 500$  BP (Carter and Clark, 1976). However, these later sites are within a time frame which could mean that this domesticated stock originated from the Middle East (Map 4.2).

**Map 4.2: Location of principal sites with rock art and/or evidence of early cultivation or herding**



The northern region of Africa has undergone major climatic changes since the end of the Pleistocene epoch (Maley, 1977; Street-Perrott and Perrott, 1993). Three major wet phases occurred in North Africa during the last 10,000 years, the first between 10,000 and 8,000 BP, the second between 7,500 and 6,500 BP and the most recent between 6,000 and 5,500 BP.

The ecological conditions during these periods were very different from the arid environment present over most of northern Africa today. Lake Chad is the lone remnant

of a series of permanent standing lakes which were scattered across the Sahara 9,000 years ago. Lake Chad was, at one time, larger in area than the Caspian Sea and is referred to as *MegaChad* during the period 10,000-8,000 BP (Grove. 1993).

The tsetse zone extended about 500 km further north than its present boundary, almost reaching the 18th parallel during 10,000-8000 BP (Smith. 1992a). Most of the present-day desert was grassland and the mammalian fauna was similar to the present fauna in East Africa. Elephants, giraffes, hippos, rhinoceros and wildebeest were only some of the large mammals which existed in the region at this time. Human populations were taking advantage of these resources, and rock engravings, paintings and cultural debris are found in areas that receive with less than 20 mm of annual rainfall today.

Smith (1992b) has argued that the ecological change between wet phases, particularly after the first Holocene wet phase, may have been the environmental stress responsible for the domestication of cattle.

Human populations living in increasingly arid regions may have started to interact with cattle in such a way as to bring the cattle partly under human control and this may have eventually led to full-scale domestication. A primary motive for such an event would have been to ensure the availability of adequate supplies of animal fat, a vital commodity for humans living in desert conditions, and cattle provide relatively large amounts of this subsistence (Speth and Spielmann. 1983).

**Table 4.1: Dates for early cattle and caprines in the Nile Valley and adjacent areas**

Site name	Country	C-14 yrs. BP	Dom. Cattle	Dom. Caprines	Sources
Merimda-Benisalama	Egypt	5830±60 5440±75	x	x	Von den Driesch and Boessneck. 1985
Fayum A	Egypt	5860±115	x	x	Wendorf and Schild. 1976
Nabta/E-75-8	Egypt	7120±150 6240±70	??	-	Wendorf and Schild. 1980
Kharga/E-76-7, E-76-8	Egypt	7890±65 5450±80	??	-	Wendorf and Schild. 1980
Bir Kiseiba	Egypt	9000±100 8150±70 8740±95 8740±70	??	-	Close. 1984
Gilf el Kebir	Egypt	6980±80	x	-	Gautier. 1980
Shaqadud	Sudan	7500 3500	x	x	Peters. 1992

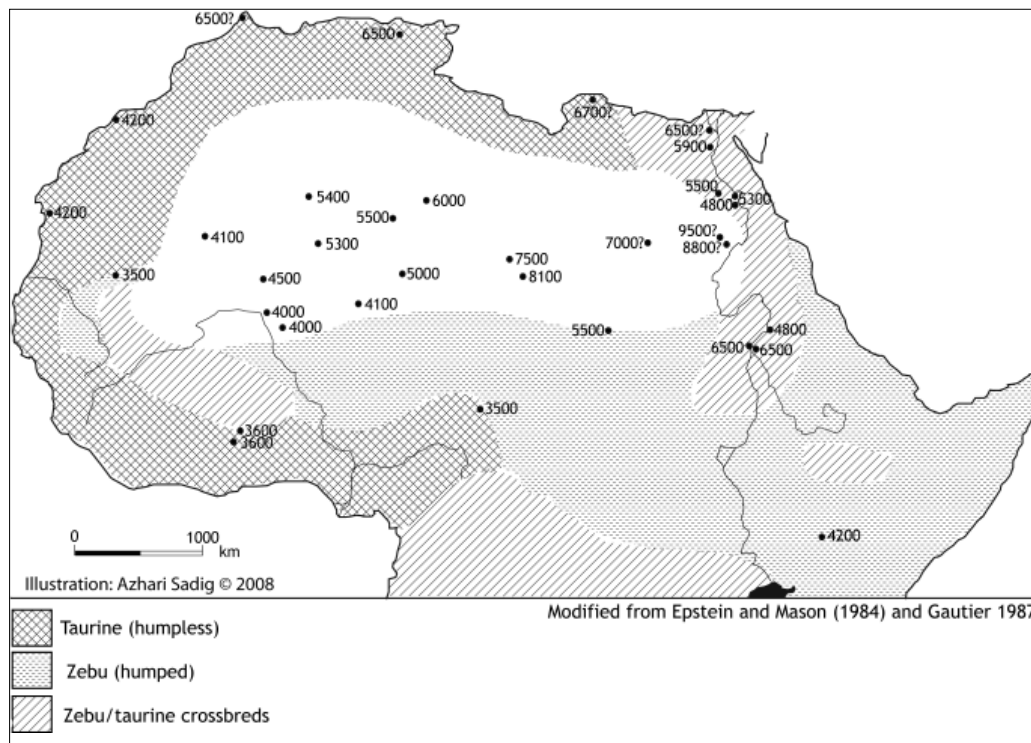
el Kadada	Sudan	4790±110 4630±80 4830±50 4730±80 4840±70 5170±110	x	x	Gautier. 1986
Khashm el Girba	Sudan	5000 2000	x	x	Peters. 1992
Kadero I	Sudan	5630±70	x	x	Gautier. 1984a
El Zakiab	Sudan	5350±90 5660±80	x	x	Tigani el-Mahi. 1988
Um Direiwa	Sudan	4950±880 5600±110 6010±90	x	x	Tigani el-Mahi. 1988
El Nofalab	Sudan	5290±100 5520±130	x	x	Tigani el-Mahi. 1988
Laqiya	Sudan	3500 4000	x	x	Van Neer and Uerpmann. 1989
Wadi Howar	Sudan	5200 5000 3000	x	x	Van Neer and Uerpmann. 1989

After Gifford-Gonzalez. 2005: 200

## Cattle

Cattle were the earliest domesticates in Africa (Map 4.3). Starting in the 1980s, Wendorf, Gautier, and their associates argued that domestic cattle were present in the 10<sup>th</sup> millennium BP in sites from the Bir Kiseiba area of the Egyptian Western Desert (Close. 1990; Gautier. 1984b; Wendorf and Schild. 1998; Wendorf *et al.* 1987). Gautier and Van Neer (1982) proposed that large bovid bone fragments from the Ti-n-Torha East Cave in Libya (8490–7920 BP) could also be of domestic cattle. Recent studies suggest that these cattle were probably domesticated from North African populations of wild *Bos primigenius* by hunter-gatherers of the eastern Sahara 10,000–8000 BP. Their origins are still controversial, and the evidence is sparse and not highly diagnostic, but Gautier (1980; 1987a; 1987b; 2001) and Wendorf (Close and Wendorf. 1992; Wendorf *et al.* 1984; 2001; Wendorf and Schild. 1980) claim domestic cattle were in the eastern Sahara at Bir Kiseiba ca. 9500 BP, and at Nabta Playa ca. 8840 BP. These dates would make African cattle domestication an independent and older event than in southwest Asia. Cave paintings dating to 6,754 BP have been found at Tassili n'Ajjer in southwest Algeria, depicting pastoralists and herds of humpless cattle (Smith. 1992b). Cattle were present to the west at Enneri Bardagu'e in the Tibesti by ca. 7400 BP and in the Acacus by ca. 7400–6700 BP (Garcea. 1995; Gautier. 1987a).

**Map 4.3: Approximate distributions of the various types of domesticated cattle found in Africa north of the equator and the earliest dates of their occurrence**



The wet climatic phase between 10,000 and 8,000 BP may have incorporated local cattle domestication, and sites in Nabta Playa and Bir Kiseiba in the eastern Sahara have yielded putative *Bos* bones dated as far back as the 10th millennium BP (Gautier, 1984a; 1987a, 1987b). Gautier and his collaborators argue that these cattle were domesticated because the ecology and climate of this area during this period would not have been capable of sustaining wild cattle populations. Evidence was also uncovered of shallow watering holes of about 1.7 meters in depth, which could have been used to provide water for domestic stock (Wendorf and Schild, 1994). A reinterpretation of the ecological and anthropological evidence led Smith (1992a) to argue against this interpretation and until more evidence is forthcoming from these sites, the question remains in the balance. Until unambiguous evidence of the domestication process, such as faunal shifts or clear size diminution, is discovered, it is unlikely that archaeology can state with confidence that cattle were domesticated independently in Africa.

Genetic analysis probably represents the most promising avenue of research to substantiate claims of African cattle domestication. New DNA evidence has shown that African cattle have been separate from those of southwest Asia for at least 25,000 years. Scientists at the Africa-based International Livestock Research Institute confirmed

through DNA analysis that indigenous African cattle were domesticated from local strains of wild ox long before the introduction of cattle from Asia and the Near East (Hanotte. 2002). Domestication, they believe, took place along the border area between modern-day Egypt and Sudan. The new research shows that cattle are an integral part of the African landscape, possessing longstanding adaptation to African savannas. Many wildlife conservationists believe that cattle are an alien species, but the new research provides evidence of their local origins. This strong evidence has confirmed that there was a separate center of cattle domestication in Africa.

There has been no evidence, until now, which could support the process of a local domestication in the Sudan. Krzyżaniak summarises this realisation by saying “*we should, however, continue the research for such information, in particular for information concerning the domestication of the wild cattle (aurochs)*” (Krzyżaniak. 1992a: 267-273). With regard to wild cattle, it is thought that this animal lived and was hunted on the middle Atbara River in the cool and arid times of the Terminal Paleolithic, around  $10,230 \pm 270$  BP (Marks. 1987:88). Wild cattle remains were also recovered from the lowest level of Site 440, a Middle Paleolithic settlement estimated to date ca. 80,000 years old on geological grounds, as described by Shiner (Shiner.1968a; El Amin. 1981). Wild cattle were also recovered from almost every site assigned to the Khormusan Industry, a late Middle Paleolithic complex dated at between 65,000 and 50,000 years old (Marks. 1968). In spite of the importance of this evidence, the question is how to determine if the Sudanese hunter-gatherers tried to domesticate that animal?

**Table 4.2: Percentages of cattle remains found at Central Sudan sites**

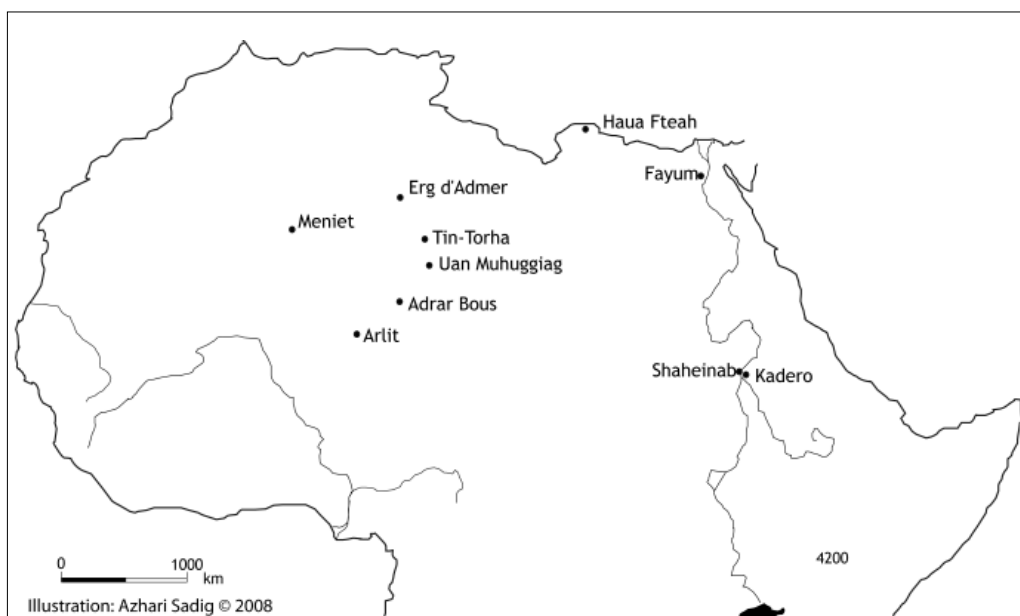
Site	<i>Bos Primigenius f. taurus</i>	Source
Shaheinab	00%	Arkell. 1953
Zakiab	33.46% / 75.77% per class	Tigani el-Mahi. 1982
Umm Direiwa I	33.54% / 43.98% per class	Tigani el-Mahi. 1982
Shaheinab	6.96% / 50.00% per class	Tigani el-Mahi. 1982
Nofalab	11.43% / 33.33% per class	Tigani el-Mahi. 1982
Kadero I	74.45%	Krzyżaniak. 1978

F: frequent = more than 100

## Sheep and Goats

Unlike cattle, the wild ancestors of sheep and goats are believed to be indigenous to the mountains of southwest Asia. These animals were undoubtedly introduced to the Sudan from outside. The earliest evidence of domestic sheep and goats in Africa appears after 7700 BP (Map 4.4). Their bones have been found at the Haua Fteah in Cyrenaica ca. 6800 BP and the Fayum ca. 6400 BP. This coincided with the opening up of a grassland niche in the Sahara, which was increasingly occupied by pastoral people e.g. Tin-Torha (Libya) from 7400 and 5300 BP, Uan Muhuggiag (Acacus Mountains, Libya) ca. 6000 BP, Adrar Bous (Ténéré Desert, Niger) c. 5800 BP, Meniet (Hoggar Mountains, Algeria) ca. 5400 BP, Erg d'Admer (Algeria) ca. 5400 BP, and Arlit (Niger) c.5200 BP (Smith. 1992a). They almost certainly came from western Asia (Gautier. 1984a), because there were no wild ancestors for sheep and goats in Africa. Close (2002) argues that sheep and goats came to Africa via the southern Sinai before Near Eastern crop complex, which is thought (Wetterstrom. 1993) to have entered the continent through the Nile Valley.

**Map 4.4: Earliest dated occurrences of domestic sheep and goats in Africa north of the equator**



These same animals, as well as cattle, are found in many Neolithic sites in Sudan, with dates going back to about 6000 BP (Tigani el-Mahi. 1982).

**Table 4.3: Sheep and goat percentages from Central Sudan sites**

Faunal percentages	<i>Ovis ammon f. aries</i> / <i>Capra</i> (sheep) / <i>Aegagrus f. hircus</i> (goats)	Source
Zakiab	2.90% / 16.30% per class	Tigani el-Mahi. 1982
Umm Direiwa I	7.28% / 9.54% per class	Tigani el-Mahi. 1982
Shaheinab	0.22% / 1.56% per class	Tigani el-Mahi. 1982
Nofalab	10.48 % / 30.56% per class	Tigani el-Mahi. 1982
Kadero I	22.10%	Krzyżaniak. 1978

F: frequent=more than 100)

## The Beginning of Pastoralism

Pastoralism is a mode of subsistence involving of the rearing of livestock (usually cattle, sheep or goats) and a process of constant movement between two or more different areas of pasture. In some cases, pastoralism is adopted as only one part of an agriculturally - based, semi-sedentary culture, while in other, more extreme cases, a wholly nomadic lifestyle is adopted (Shaw and Jameson. 1999: 459). With the evidence available, it is likely that the Neolithic people of Central Sudan were pastoralists. Their subsistence consisted mainly of herding cattle and there is evidence that they moved to different areas for pasture. However, the term “pastoralist” is confusing. This confusion may arise from imprecise application of the term “pastoralist” to any person or community possessing domestic animals, irrespective of how important these animals may have been in the overall lifestyle of the people concerned (Phillipson. 2005). Phillipson (2005) uses the term “herder” to designate someone who owns or controls domestic livestock. However, the term pastoralism is more applicable to the Neolithic herders of Central Sudan and Upper Nubia. It includes animal husbandry: the care, tending and use of animals such as goats, cattle, sheep, and so forth (see: Lees and Bates. 1974). Pastoralism may have a mobile aspect, involving moving the herds in search of fresh pasture and water.

One of the important questions concerning the domestication of animals is the kind of human action by which these domesticates were introduced to the Sudan Nile Valley. More traditionally oriented theories hold the opinion that the occurrence of Neolithic domestic animals in the Sudan was the result of the influx of pastoral populations from the Middle Holocene Sahara. These pastoralists are thought to have trekked with their herds southwards, along the Nile, bringing with them pastoral technology (Hassan. 1986: 98-99, Clark. 1980: 568; 577). Wendorf argues that the first domestication or human

control of cattle occurred in the Nile Valley, possibly in the area between Tushka in Egypt and Dongola in Sudan, between 12,000 and 10,000 radio carbon years ago (Wendorf, personal communication. 2003).

The only evidence to support this claim has been found at Tushka, where people were using cattle skulls (wild) as head markers for burials between 14,500 and 12,500 years ago. Wendorf also argues that from Tushka, the cattle herders moved into the desert when the summer rains intensified around 10,000 years ago, and they probably did this because the wild grasses that grew after these rains were good pasture.

The view that the fauna from the Neolithic site of Esh Shaheinab near Khartoum (5<sup>th</sup> to 4<sup>th</sup> millennium BC) contained 98% wild animals (Bate. 1953) has been challenged by Peters (1986), who has restudied the surviving material and concluded that the large bovids which comprise a large proportion of the assemblage were probably domestic cattle. A similar situation was found by Gautier (1984b) at Kadero I, nearby, dated to about 4200 BC.

With reference to some evidence that the first domesticated animals appeared at the Sudanese section of the Nile River at c. 6000 BP (ca. 4900 BC), Krzyżaniak suggests that it is difficult to connect the appearance of cattle with the climatic deterioration in the Sahara, because there exists other evidence that the climatic deterioration occurred before 5750 BP (Krzyżaniak. 1992a: 267-273). As an alternative, he suggests “*the acquisition of domestic animals by the Sudanese food-gatherers resulted from a functioning long-distance exchange network*” (Krzyżaniak. 1992a: 269). Such networks, if they did exist, could already have existed in the Nile before Neolithic times. Caneva agreed with Krzyżaniak that earlier contact between the Nile and the Sahara had taken place since the Mesolithic period, which could have allowed the diffusion of domestic animals and the pastoral economy in the Sudanese regions (Caneva. 1993: 89). Caneva and Marks stress on what they call “*the Saharan cultural elements*”, which occurred outside the Nile at sites like Shaqadud (Caneva and Marks. 1992). Such elements include mainly techniques of decoration found at Shaqadud as well as some technological aspects, which did not occur in the Neolithic sites along the Nile Valley. This argument includes common cultural features that had been shared by people inhabiting the regions between the Nile and the Ennedi/Tibesti mountains, as well as to the east of the Nile Valley, since the 7<sup>th</sup> millennium BC (Caneva and Marks. 1992: 23-24). The problem is that these elements did not occur in the Neolithic sites along the Nile Valley before Shaqadud. In fact, these contacts should have reached the Nile before they reached Shaqadud, considering that Shaqadud’s dates are not earlier than those of the Nile sites (Mohammed-Ali. Personal communication, see also El Amin and Khabir. 1987).



It is obvious from the above hypotheses, which agree that livestock was introduced from outside, that there are two arguments concerning the origin of the domestic animals in the Sudan. The first suggests that the first domestic animals were introduced from the north, i.e. from Egypt, while the second suggests that earlier contacts preceding the Neolithic period between the Nile and the Sahara, resulted in the expansion of the pastoral economy in the Nile.

Chronology and relations between Sudanese and Saharan areas (Paris. 2000; Smith. 1992a) suggest that domestic stock was introduced from the Sahara as it became drier (Haaland. 1992; Hassan. 1997). Cattle, sheep, and goats appear by the 6<sup>th</sup> millennium BP (Gautier. 1984b; 1984c). Local assemblages of lithics and ceramics show continuity (Caneva. 1987, 1988; Haaland. 1995; Marks and Mohammed-Ali. 1991), indicating that any movement of Saharans into the region was on a small - scale, and cultural contact was more important to socioeconomic change.

The entry of Saharans may have been eased by prior social links with the Sudan, indicated by trade and common ceramic styles. Compared to the original Saharan herding environments, the Sudanese Nile offered more dependable, productive resources. This area also posed no particular problems for cattle, as it lies within their wild zone. Like earlier local hunter-gatherers, pastoralists used large, semi-permanent camps near the Nile, as at Shaheinab and Geili (Caneva. 1988; Haaland. 1995; Krzyżaniak. 1991). Domestic animals are the dominant large mammals at many sites, such as Kadero I ca. 5000–4000 BP, but were one of to a wide range of wild animals used by earlier hunter-gatherers (Gautier. 1984c; Haaland. 1992). Unlike Saharan pastoralists, herders in this better-watered landscape are thought to have used plants more intensively than their hunter-gatherer predecessors.

Site structure and increased use of grindstones at Kadero 1, Um Direiwa, and Zakiab indicate to Haaland (1992) that, as early as 5000 BP, pastoral groups were cultivating sorghum that was morphologically wild (Stemler. 1990).

Social differentiation appeared among Sudanese herders by the 6<sup>th</sup> millennium BP. Clusters of especially rich graves of men, women, and children at Kadero I suggest variations in wealth (Krzyżaniak. 1991), but there is no evidence of social stratification. Pastoral intensification and a decrease in wild animal use are also evident at some sites in the Middle Nile after 5300 BP. Despite these developments, the spread of herding was patchy: at Shaqadud, east of the Nile, subsistence focused on wild resources as late as 4000 BP (Marks and Mohammed-Ali. 1991; Peters. 1991).

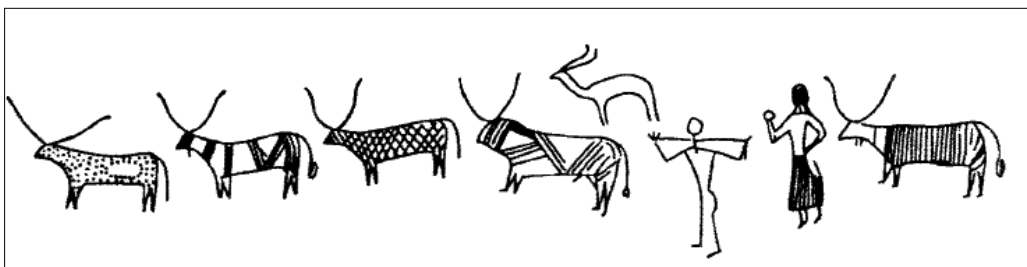
Evidence of animal husbandry in Nubia presents a rather varied picture. It is difficult to reconstruct the economic aspects of the Khartoum Variant groups, given the rarity of faunal remains. No animal domestication is evidenced, and the remains are primarily of

fish and fresh-water molluscs, particularly *Aetheria elliptica*, indicating that these people were still very much directly dependent on riverine resources. The frequent occurrence of grinding stones and ostrich eggs at these sites serves to indicate both the exploitation of local wild plants and hunting of the ostrich.

Evidence of hunting is very clear in the material of Abkan sites in Lower Nubia. Although economic subsistence is not represented in the archaeological remains of Abkan sites, one of the largest and best known finds of Nubian Prehistoric art was at Abka, closely associated with occupation remains at the Qadan and Abkan industries of the Final Stone Age and the Neolithic. Curiously, in view of the presumed subsistence activity of the people who lived at Abka, there are no representations of fish, although one semi-abstract design might be a fish trap (Myers. 1958: Pl. xxxiv). Although Perkins (1965) considers the fauna from the Abkan site ASG-G-25 at Wadi Halfa to be wild, his “large bovids” may very well also have been domestic cattle (Grigson. 1991: 133). The collection from this site contains catfish, Nile perch, ostrich eggshell, Egyptian goose (*Alopochen aegyptiacus*), hare, gazelle, large bovid and wild ass. Domestic goat (*Capra hircus*) seems to be represented by a single distal epiphysis found in the upper layer of the site and it may be Terminal Abkan or intrusive (Grigson. 1991: 222).

Another Abkan faunal assemblage was described briefly by Carlson (1966: 53-62) and includes fish, hare, gazelle and remains of a large bovid which could have been domestic cattle at least for part of it (Figure 4.2). The scanty knowledge does not permit an unquestionable affirmation that the Abkans were already practicing animal husbandry, though it seems that they may have combined gathering and hunting with pastoral activities.

**Fig 4.2: Graffiti of domesticated cattle with male and female human figures, from the Faras site in Sudan. These drawings were found on pottery dated to the 5th millennium BP (reproduced from Grigson 1991).**



The faunal remains recovered from the graves at site R12 near Kerma indicates that domestic livestock was very important, but collecting and hunting were not minor activities, as shown by the large amount of hippopotamus teeth, gazelle bones and bivalves (Pöllath. 2008: 77). The graves contained a wide variety of faunal remains

including different animal products, eggshell, mollusc shells, bones and teeth, worked into ornaments and other tools. Cattle were certainly most important, as demonstrated by the large amount of tools made from cattle bones and by the burciana that were a sign of wealth, power and influence. Lambs buried with the deceased indicate that sheep also played a vital role in burial customs.

## Botanical Remains and Evidence of Cultivation

Before food production, Mesolithic people of Central Sudan made intensive use of wild plants. Early Khartoum people ca. 9000-6000 BP lived in large settlements, fished, hunted, and used *Celtis integrifolia*, *Echinocloa colona*, *Panicum tugidum*, *Salix sunbserrata*, *Setaria sp.*, *Sorghum sp.*, and *Ziziphus sp.* Plant impressions in pottery suggest that wild cereals were key dietary elements (Arkell. 1949; Haaland. 1987a). Deductions about the exploitation of domesticated plants during the subsequent Neolithic period remain hypothetical. Plant remains were limited to the imprints of grains found on potsherds excavated from several Neolithic sites along the Nile. Most of these imprints have been identified as wild sorghum (*Sorghum verticilliflorum*), and very few instances of the wild ancestors of millet (*Pennisetum vidacum*) (Magid, 1989).

### Morphological data

In Sudan the area between 15 and 20° north latitude corresponds roughly to Harlan's bicolor zone where the first domestication of sorghum is believed to have occurred (Harlan 1971: 128-135). This area includes the Qoz of Kordofan, the area around Khartoum and Atbara. In addition, the Jebel Marra region in western Sudan is another likely area which may yield direct evidence of domestication of millet. The last point is based on the fact that this region is one of the most conspicuous areas of interaction among wild, weedy and cultivated races of pearl millet (Harlan. 1971: 471). The origins of crop sorghums, in the form of the primitive race bicolor, have generally been assigned to the sub-Saharan thorn savanna belt, from Nigeria to the Sudan, from *arundinaceum* (Harlan. 1971: 471); although an Ethiopian origin has also been suggested (Doggett and Prasada. 1995: 173).

Macrobotanical remains and plant impressions in pottery suggest that Shaheinab people used *Acacia sp.*, *Celtis integrifolia*, *Elaeis guineensis*, *Hyphbaena thebacia*, *Ziziphus sp.*, possible wild or domestic *Citrullus sp.*, other Cucurbitaceae, and *Nymphaea*; grasses include panicoids, *Setaria sp.*, *Sorghum verticilliflorum*, and wild *S. bicolor* ssp. *Arundinaceum* (common wild sorghum). Morphological data indicate that sorghum was wild (Arkell. 1953, Haaland. 1987a).

Another site providing evidence of domestic plants, is Shaqadud site. On the basis of the botanical evidence from Shaqadud Cave, it appears that two distinct but complementary strategies

of plant exploitation were used (Magid. 1991: 196). The evidence of fruits of *Zizyphus* (*Nabag*) and *Grewia* indicates seasonal collection of these wild plants. The second strategy is apparent in the presence of domestic *Pennisetum*. The proportionately small numbers of *Pennisetum* remains might indicate that it played a relatively small role in the overall diet (Magid. 1991: 196).

Large quantities of carbonised *Sorghum bicolor* (L.) Moench grains, spikelets and inflorescence fragments has been found in a storage pit at Jebel et Tomat (13° 36'N, 32° 34'E), and small amounts of carbonised sorghum found in eleven levels of the midden excavated there, suggest that sorghum was the staple grain of the people who inhabited the site. The date of 245 ±60 AD (UCLA 1874M) was obtained from a concentration of carbonised plant remains in the floor of the pit, which was dug into the dark clay loam on which the midden rests, probably at about the same time as the accumulation of the middle or beginning of the upper unit of the midden. The remains of wickerwork matting and many fragments of thick stalks of cereal grass suggest that the pit may have been a silo lined with stalks and mats. If so, it is not dissimilar to the pits made today in the area for storing grain (Clark and Stemler. 1975: 588-91).

### **Archaeological evidence**

Sorghum has a history of early dates within Africa that have been discounted following more detailed examination. Cultivated sorghum presents one of the more perplexing problems in African agrarian history. It is found in archaeological sites in Korea and India millennia before confirmed archaeological finds in Africa (Blench. 2003: 276). The evidence for sorghum in Asian sites clearly has implications for the antiquity of its cultivation and domestication in Africa. Fuller's recent re-analysis of claims of domesticated cereals in India, confirms the presence of pearly millet, sorghum and two legumes (cowpeas and hyacinth beans) by the mid-second millennium BC (Fuller. 2006). Finger millet is present from around 1000 BC. This is one case where focusing solely on morphological domestication is too limiting a strategy for understanding the origins of domesticated sorghum. It is now well established that sorghum, at least, will not undergo morphological changes that identify it as domesticated if harvested by stripping the grain from the stalks or beating it into baskets. Sorghum impressions (all morphologically wild in status) are plentiful on early Holocene potsherds in Nubia; grindstones are numerous and settlements occur in alluvial settings with heavy clay soils, contexts well suited for growing sorghum, whether for food or beer. Wasylikowa and Dahlberg (1999: 11-32) show that the carbonised sorghum grains found at Nabta Playa in southern Egypt at ca. 8000BP are exclusively wild.

Material from Neolithic sites of Kadero I, Zakiab and Um Direiwa shows that the inhabitants were probably cultivating wild sorghum. The discoveries at these sites include several imprints of sorghum in potsherds and an extremely large number of grindstones (Haaland. 1981a: 196-197). The dates obtained from the site of Zakiab range between

5350  $\pm$  90 BP to 5660  $\pm$  80 BP. Three radiocarbon dates were obtained from the site of Kadero I; the oldest of these is 5700  $\pm$  100 BP and the youngest is 5030  $\pm$  70 BP, as well four radiocarbon dates from the site of Um Direiwa I; the oldest of these is 5600  $\pm$  110 BP and the youngest is 4950  $\pm$  80 BP (Haaland. 1981a: 55).

These dates provide the earliest evidence of exploited wild sorghum in Sudan. In addition to these, one impression of sorghum *verticilliflorum* on a potsherd was recovered from the Neolithic site of Shaheinab (Magid. 1982: 97-98). Several dates were obtained from this site (Arkell. 1953, Haaland. 1981a, 1981b, 1987a); all these are more or less contemporary to those obtained from the sites of Zakiab, Kadero I, and Um Direiwa I. Stemler (1990), who identified the plant remains from these sites, points out that the sorghum imprints are not morphologically different from those of wild grain, the only exception being one impression from Um Direiwa that bears some resemblance to domestic sorghum (Stemler. 1990: 87-98). Stemler's main argument is that "*the type of sorghum looks like wild sorghum*", but "*there is a possibility that it was a primitive domesticate very similar to the wild*" (Stemler. 1990: 96).

Regarding the other evidence of cultivation, the many of grindstones at the Neolithic sites could not be used as direct evidence of cultivation, although their frequency may point to a greater reliance on plant food (Plate 4.2). On the other hand, there is a clear decrease of the other indirect evidence, such as the tools that may have been used as sickles. The only tools that were discovered and that may have been used as sickles are lunates and backed tools (Wendorf. 1968b: 943).

**Plate 4.2: Fragments of some of the broken grinders recovered from the Um Direiwa site during excavation (source: Haaland 1995.)**



In the case of the Neolithic sites in the region of Khartoum, Haaland suggests that these microlithic tools were not used as sickles because so few of them are present (Haaland. 1987a: 76). In another place, she presented evidence to argue that the early Neolithic populations cultivated sorghum (Haaland. 1981a: 213-215). This hypothesis is based on various arguments:

- a. The large dimensions of the early Neolithic base settlements could have accommodated big populations,
- b. A large number of grindstones used for the processing of grain occur in these settlements,
- c. The presence of lithic gouges, which are thought to have been used as blades for hoes in tilling the soil.

Haaland also used a botanical argument when she states that the simple sweeping off the ground of the grains of sorghum -cultivated or not- cannot lead to domestication unless a harvesting tool (knife, sickle) is used (Stemler. 1980: 514-516, 521). In his discussion of this hypothesis, Krzyżaniak states that: *“It is however, difficult to accept this hypothesis on the basis of the archaeological ground mentioned above before testing its arguments. Firstly, we still know very little about the actual dimensions of the early Neolithic settlements at any one time when they were functioning. Secondly, observation made at Shabeinab and Kadero I point to a possibility that a considerable part - perhaps the majority- of grindstones found at the sites were used to perform some function other than crushing or milling grain. Thirdly, as regards the function of the gouges, their use can only be hoped to be determined by use-wear analysis; traditionally they are thought to have been used in wood-working”* (Krzyżaniak. 1992a: 269-270).

Unfortunately, our present understanding of the early development of seed-crop agriculture in the Sudan depends largely on such indirect evidence. The artifacts, which usually inferred early food production, include such items as grinding stones, sickles, pottery and ground stone axes (Frankenberger. 1979:21). However, it is important to reiterate that a certain degree of caution should be exercised when such material is considered as diagnostic signs of food production in the Sudanese Nile Valley. Such artifacts have been found in non-agricultural contexts as well. Taking this into account, the finding of such pieces of evidence is of some value in filling the gaps left by exiguous records of direct evidence.

## **Indirect Evidence**

Some of the earliest finds of indirect archaeological evidence for plant domestication in the Sudan have been found in the Early Khartoum sites. The radiocarbon dates for these sites demonstrate that pottery manufacture took place much earlier in this region than in the Egyptian Nile Valley (Plate 4.3). The un-burnished wavy line decoration characteristic of the Early Khartoum sites has also been found in sites in Ennedi in Chad as well as at Amekni in the Hoggar region of Algeria (Arkeell. 1972: 222). These Sahara sites register dates between

5230 and 6100 BC (Arkell. 1972: 222). Clark postulates that the wide distribution of this pottery gives a strong indication that an exchange of knowledge and trade goods was occurring all across North Africa, and that “*a knowledge of plant cultivation as well as domestication of animals could equally have been diffused to the limits of the Savanna at this time*” (Clark. 1970: 201).

**Plate 4.3: Rimsherd from a large vessel, probably used for storage, from Aneibis, Atbara region (source: Haaland 1995.)**



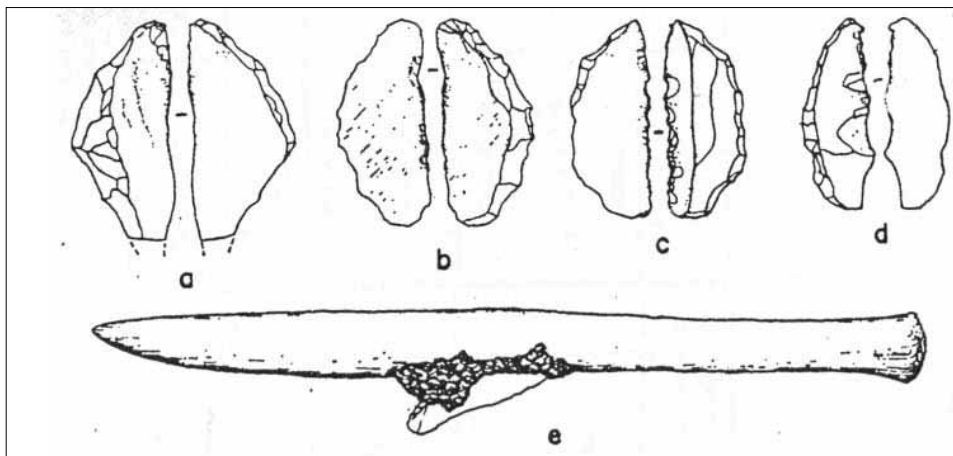
Magid (1989: 123-129), summarises the association of pottery with the exploitation of food-plants in the following points:

- a. The introduction of pottery probably demarcated the beginning of a new adaptation in which familiar potential food-plants were now exploited, for instance the start of utilising seeds and grains of cereals. Pottery might have provided the basic requirement for cooking these seeds and grains before serving it as food.
- b. Pottery containers would also provide means of storage for the durable food-plants, e.g. seeds, berries, fruits and nuts, to be used during periods of need or when they were not available in nature.

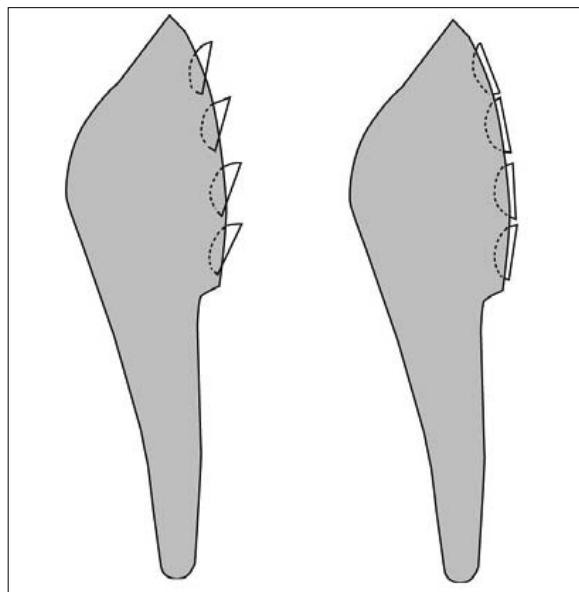
Another area of the Sudan which provides indirect evidence of domestication of plants comprises the Butana and the Atabai plains east of the Nile Valley in the Eastern Sudan (Mohammed-Ali. 1985: 26). Neolithic sites have been located at both sites contemporary with the last half of what has been designated as the Kassala phase, there occurred a group of over fifty sites termed “Jebel Mokram”. This phase has been generally dated to around the 2<sup>nd</sup> millennium BC and refers to sites characterized by seasonal occupation by nomadic groups who moved into the Butana and the Atbai (Mohammed-Ali. 1985: 26, Fattovich *etal.* 1984: 182). In addition to domestic cattle, some of the potsherds recovered from these sites contain amounts of macrobotanical materials. Some of this was identified as domestic sorghum (Fattovich *etal.* 1984: 182).

Other indirect evidence of food production is the use of lithic tools associated with plant activities. These comprise luntaes, sickle-blades, grinders, rubbers, and sandstone rubbers. It has been suggested that hafted lunates dated to ca. 12000 BP were used as sickles (Wendorf. 1968b: 943, Wendorf and Schild. 1976: 276-277) (Figure 4.3). According to Honegger (2008: 172) there are two main groups of lunates; the large lunates which “*must have been sickle or plant knife elements*”, and the smaller ones, “*which are identified as arrowheads*” (Figures 4.4a and 4.4b).

**Fig 4.3: Suggested method of hafting of lunate-sickle from Toshka (source: Wendorf and Schild 1976, 277.)**

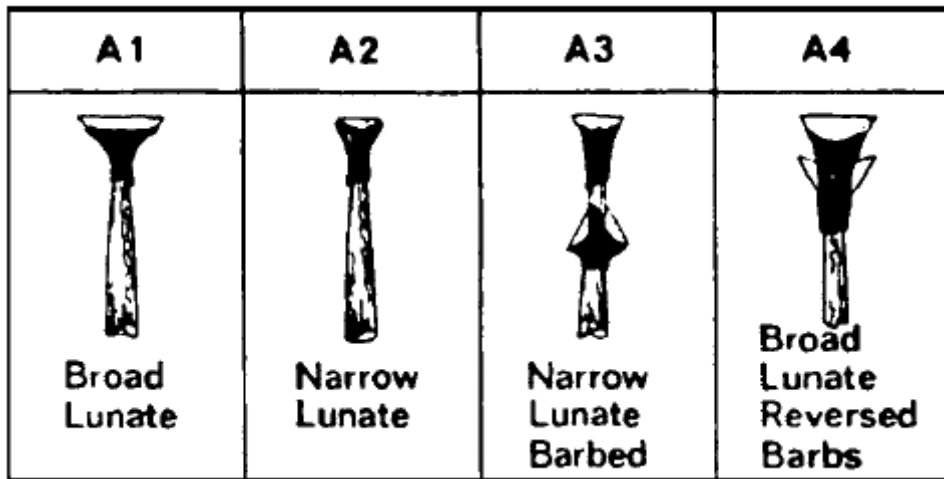


**Fig 4.4a: Proposition of reconstitution of sickles with two different insertion methods for the microliths, in accordance with the observations made at Kadruka (source: Reinold 1994) and at Kerma**





**Fig 4.4b: Outline representing lunates hafted as arrowheads or barbs, the way they were found at Naga Ed-Der, 2320-1760 BC (source: Clark et al. 1974, Fig. 9, p. 362.)**



According to Magid (1989: 135), the interpretation suggested by Wendorf for how the lunates were hafted and what function they performed is not applicable in the case of the lunates which were recovered from Central Sudan, for the following reasons:

- a. Scientific examination of the lunates under a microscope did not show any visible traces of sickle-gloss, that would indicate that they were probably used as tools to cut food-plants.
- b. The tools would have been too small to use as sickles if they had been hafted.
- c. It is evident that there was a noticeable decrease both in the number and size of lunates from the period of Early Khartoum to those of the Shaheinab. Thus if lunates were used for the exploitation of food-plants, they would have also become more numerous over time.

Other artifacts played an important role in food production process. For example, the numerous grinders found in Neolithic sites indicate the increased importance of vegetal foods such as sorghum and perhaps the beginning of their cultivation (Haaland. 1981a: 215, Magid. 1989: 149). Evidence of grinders was recovered from late sites such as Jebel Tomat. The earliest evidence of domesticated cereals, namely *Sorghum bicolor* (L.) Moench, from the Central Sudan, was found at this site. It is likely that grinders were used more generally during this late period for grinding food-plants more than at any time before (Magid. 1989: 149).

According to Magid (1989: 177) the only tool which might be related directly to cultivation activities are the sandstone rubbers, which are believed to have been used for shaping and polishing wooden and bone artifacts (Plate 4.4).

**Plate 4.4: Sandstone rubbers from Shaheinab site (source: Arkell 1953.)**



As stated previously, at present there, to this author's knowledge, no direct archaeological evidence for plant domestication in the Sudan during the Neolithic period. This seems quite strange considering that this area was probably one of the places where the first attempts at domestication took place in Africa (Vavilov. 1951, Harlan. 1971).

### **Other Subsistence Economies**

Archaeological materials from the Neolithic sites in the Middle Nile show that fishing, shellfish collecting, hunting, and plant gathering were important subsistence activities.

Fish represent a major aquatic resource exploited by the Neolithic people. Six Nile fish genera, all present in today's Nile, were identified by Tigani el-Mahi at Zakiab, Um Direiwa, Shaheinab and Nofalab (Tigani el-Mahi. 1982: 59-78). Among these six genera, four are present at all the Neolithic sites, namely *Tilapia*, *Lates*, *Synodontis* and *Clarias*.

The remains of bone harpoons, spears and fish hooks suggest how fish were caught. Tigani el-Mahi (1982) argues that other methods were used for fishing; including traps, baskets, and poison. Unfortunately, there is no direct evidence for the use of the last three methods. Peters (1991), in his study of fish remains in Mesolithic sites in Atbara region, suggests that nets were used, although no remains of these have been found. Some disk-shaped pottery artifacts that are frequently recovered on all Mesolithic sites in that region might have been net sinkers (Haaland. 1995: 159).

The importance of the aquatic resources is further indicated by the numerous shell remains found. At Shaheinab, 15 species of shell fish were identified (Arkell. 1953: 11). These include *Ampullaria wernei*, *Lanistes carinatus*, *Melanooides tuberculata*, *viviparus unicolor*, *Cleopatra bulimoides*, seven species of bivalves and three species of land-snails.

At Shaheinab 32 mammalian species have been identified. Of these buffalo, giraffe and hippopotamus were the most plentifully represented among the wild animals (Bate. 1953: 11). Swamp-loving animals (reed rat, water mongoose, and Nile Lechwe) were absent. Antelope had noticeably decreased comparing with Khartoum Hospital site. Mammalian remains are also abundant on the other Neolithic sites in the Middle Nile and it shows that a wide range of animals was hunted. The hunting is also practiced by inhabitants of Butana sites. The faunal materials from Shaqadud certainly attest to hunting. Most of the animals hunted during the Neolithic were still being hunted, although the larger antelopes no longer found and hare has made an appearance. Small antelopes were hunted, as were giraffes; a large part of one was found in the middle cave deposits (Marks *etal.* 1985: 275).

Macrobotanical remains suggest that the only remains found were seeds of the hackberry tree (*Celtis integrifolia*). This type of seed was found on many Neolithic sites in Central Sudan. The inner seeds remained, and the outer parts of the berries were probably eaten (Haaland. 1987a: 181). Neolithic people also used *Acacia* sp., *Elaeis guineensis*, *Hyphenaena thebaica*, *Ziziphus* sp., possibly wild or domestic *Citrullus* sp., other *Cucurbitaceae*, and *Nymphaea*; grasses include panicoids, *Setaria* sp., *Sorghum verticilliflorum*, and wild *S. bicolor* ssp. *arundinaceum*.

Faunal remains from the Neolithic sites in Lower Nubia include those of wild animals and fish. Although no direct evidence of food production has been found for the two cultures, the dominance of small sites in Khartoum Variant, both along the river and far at least 20 km west of the Nile, has been interpreted as evidence of a pastoral economy. Evidence of hunting is very clear in the material of Abkan and Khartoum Variant sites. Although economic subsistence is not represented in the archaeological remains of Abkan sites, it seems that the Abkan people essentially exploited the river valley, judging from the remains of mollusks and fish (*Lates niloticus*, *Clarias*). Land-based creatures, such as the gazelle, the ostrich and the goose (*Alopochen aegyptiacus*), are also represented among the faunal remains. Finally, the metatarsal bones of domestic goats may possibly be linked with the Abkan stratum at site AS-6-G-25, excavated by the Scandinavian Joint Expedition (Nordström: 1972).

The Neolithic people of Upper Nubia had a mixed subsistence economy, including animal husbandry, hunting, and gathering. Major faunal resources for subsistence were probably available within the region. As discussed before, the R12 faunal assemblage

reveals an increase in exploitation of domestic animals, especially cattle. The faunal profiles seem to suggest that hunting wild animals, including some very large game, such as elephants, appears to have been a significant activity in the community, though it is difficult to say whether elephants were present in the vicinity of E12 during the Neolithic. The finds from this cemetery are exclusively ivory objects which are not helpful in answering this question. The evidence of wild animals shows that Nile Valley inhabitants exploited the aquatic resources and went on hunting trips, exploiting the River Nile itself as well as the riparian forest zone and the adjacent semi-desert (Pöllath. 2008: 73).

## Conclusion

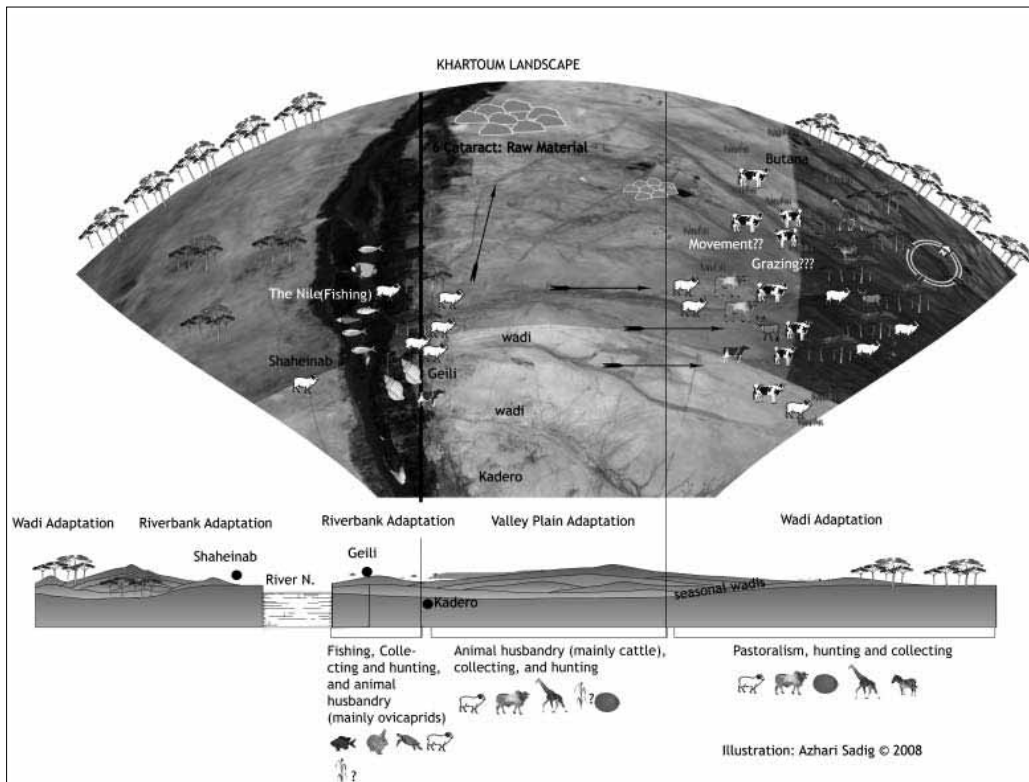
The archaeological and morphological evidence of Neolithic subsistence show that the people practiced multi-resource exploitation during that period. There is evidence of food production based on animal husbandry around 6000 BP. It seems that all riverine settings of the Middle Nile region during the 6<sup>th</sup> and 5<sup>th</sup> millenniums BC were occupied by populations following basically similar mixed - economy strategies (Figure 4.5), which consisted of the following (based on Krzyżaniak. 1984: 314):

- a. Riverbank adaptation: subsistence based on fishing, collecting and hunting, supplemented by small-scale animal husbandry (possibly only of the *ovicaprids*). The Khartoum Variant sites suggest fairly stable, long-term occupation by a relatively sedentary population. Although only bones of fish and some mollusks have been found associated with the riverside sites, the presence of many formal tools in the lithic industry suggests a mixed - economy adaptation, albeit one without any domesticated plants or animals. The Abkan can also be reasonably identified as a mixed - economy population. The Abkan adaptation seems to have focused on fishing supplemented by hunting and gathering. Large quantities of fish remains are associated with Abkan sites. Also, a variety of hunted animals, including gazelle, large bovids and geese, as well as grinding stones, are found at most sites. As in the Khartoum Variant, the Abkan mixed adaptation may not have included use of domesticated plants and animals.
- b. Valley plain adaptation: subsistence based on large-scale animal husbandry (mainly cattle) of pastoral character combined with the intensive, and perhaps already with elements of specialisation, collecting of seeds of wild tropical cereals, other grasses, tree fruits, mollusks, and some hunting. The evidence from Kerma and Dongola areas permit identification of such adaptation. Faunal remains from Kadruka and el Multaga sites represent a sedentary or semi-sedentary mixed-economy population, similar to that of Central Sudan. The remains from the Neolithic sites in Central Sudan represent a sedentary or semi-sedentary mixed-economy population, which, in some cases, included cultivation of domesticated plants, and herding of domesticated animals. Haaland argues

that the processes of cultivation started at an early date and constituted the selection pressures which finally led to the evolution of domesticated sorghum (Haaland. 1987a). She also mentions that the material from Neolithic sites such as Kedaro I, Um Direiwa and Zakiab shows that the inhabitants were probably cultivating wild sorghum (*S. verticilliflorum*) (Haaland. 1992: 50). As far as archaeological and morphological evidence is concerned, cultivation is much less certain, indicating human utilisation of wild varieties of sorghum rather than clearly domesticated sorghum.

- c. Wadi adaptation: subsistence, probably based on pastoralism, hunting and collecting, observed at the sites of Shaqadud (50 km from the River Nile bank), Sheikh el Amin (18 km away), Wad el Amin (25 km), Bir el Lahamda (40 km), and Wadi Rabob (58 km). According to their location with respect to the Nile, the settlements each had a different socio-economic orientation: dry season camps in the alluvial plain or Butana plain, exploiting the aquatic resources (in the case of last four sites), base sites occupied all-year round in the alluvial plain or Butana and orientated to cultivation, and herding camps in the Butana savanna during the rainy season (Haaland. 1987b: 216).

**Fig 4.5: Hypothetical illustration of the economic strategies of Neolithic communities in the Khartoum Nile environment**



# 5

## Neolithic Settlement Patterns

### Introduction

The term “settlement pattern” is applied when a group of people occupies a particular geographical region to exploit its resources. The study of settlement patterns means the study of the relationship between the people, particularly prehistoric people, their environment, and how they adapted themselves culturally and economically to the environment in which they were living. The studies of the material remains (cultural and biological) are basic in achieving these objectives. Therefore, the study of settlement patterns is very important, because it provides information about the environment, technology and social organisation.

Generally, settlement patterns are defined as the result of relationships between people who decided, for practical, political, economic, and social considerations, to place their houses, settlements, and religious structures where they did (Nir. 1983).

Another definition, which is presented by Trigger, suggests that two approaches have dominated the settlement pattern (Trigger. 1968: 54). The first approach is primarily ecological and often appears to be based on the assumption that the settlement pattern is a product of the simple interaction of two variables: environment and technology. This approach tends to be concerned with the size and the distribution of the whole sites. The second approach uses data as a basis for making inferences about the social, political and religious organisation of prehistoric cultures. This approach concentrates on the patterning within the individual settlement.

According to these definitions settlement sites are the areas around which a group of people centered their daily activities. That means a settlement refers back to domestic activity. Generally, the distribution of sites provides the most important information for any archaeological interpretation because it provides the clues for answering many questions regarding adaptation. Moreover, the type of settlement sites provides information which is very closely related to the environment, technology, and social organisation of the inhabitants. The settlement site can also be called “habitation site”, it is the most commonly excavated type of site because this is the place where prehistoric people lived. Most of the information about the past cultures is retrieved from such sites. Often, settlement sites encompass a group of a smaller specialised sites, such as quarry sites, sites for pottery production, tool making etc.

## Central Sudan

Generally, the Neolithic sites in Central Sudan are large and the occupation layers tend to be of considerable thickness, suggesting long periods of occupation. Cemeteries associated with some of the sites (Kadero I, el Kadada and el Ghaba) provide further support for interpretation of long, or at least regular, seasonal occupations.

Tables 5.1a, 5.1b and 5.1c show that most Neolithic sites in this region, especially in the Khartoum area, are situated on alluvium and they are all located on natural mounds slightly elevated above the alluvial plain. They are also heavily deflated, both by erosion and by human activities such as house building, and by tracks passing across the sites. Furthermore, most sites are disturbed by later burials, mainly Meroitic graves and, less frequently, by Christian and Moslem graves. In Central Sudan 16 sites have been studied in some detail: three on the west bank of the Nile (Shaheinab, Nofalab, and Islang), seven on the east bank of the Nile (Geili, Kadero I, Kadero II, Zakiab, Um Direiwa I and Um Direiwa II, and the site of Haj Yusif on the east bank of the Blue Nile). Three sites are located along the White Nile and Gezira plain (Rabak, Jebel Tomat and Jebel Moya). Another two sites are located in the Shendi area (el Kadada and el Ghaba) and one site in the western Butana plain (Shaqadud). Recently, Fernández and his team reported the existence of Neolithic sites along the Blue Nile and Wadi Soba (Fernández *et al.* 2003: 85-90).

Table 5.1.a: Aspects of settlement patterns among the Neolithic sites of Central Sudan: Khartoum

Site	Distance from the water -system	Horizontal extent (in metres)	Elevation (in metres)	Average depth (in cm)	Topographical location
Shaheinab	600 m from the Nile River	6,000	0.7	70-20 Ca.	Situated on a sandy ridge forming a terrace of an old riverbank of the Nile
Geili	2 km from the Nile River	2,700	4	c.120	On a sandy clay mound
Kadero I	6.5 km from the Nile River	28,800	1.8		Located on a low, eroded mound of sand
Kadero II	7 km from the Nile river	10,000	0.5	40	On a flat sandy plain
Haj Yusuf	5 km east of the Nile River	45,000		20	
Zakiab	ca. 4,5 km from the Nile River	2,400	3	50	On a small mound forming a part of an old river bank of the Nile
Islang	2,2 km from the Nile River	6,000	Unspecified	40-100, (one trench =105	Situated on an eroded gravel ridge which seems to be part of an old river bank of the Nile
Nofalab	c. 650 m from the Nile River	30,600	2,3	40 -110	On an eroded sandstone ridge
Um Direiwa I	7 km from the Nile River	9,000	1.84	5-70	Located on an alluvial plain mound
Um Direiwa II	7 km from the Nile River	10,000	0.2	Unspecified	Located on an alluvial plain mound



Table 5.1.b: Aspects of settlement patterns among the Neolithic sites of Central Sudan: Shendi and Butana

Site	Distance from the water -system	Horizontal extent (in metres)	Elevation (in metres)	Average depth (in cm)	Topographical location
Shaqadud: S1-A	50 km from the Nile	150 m <sup>2</sup>	Unspecified	3.35 m	Inside a sandstone cave
Shaqadud: S1-B	50 km from the Nile	ca. 15,000 m <sup>2</sup>	unknown	3 m	On a large, unbroken but heavily deflated and eroded midden
Es-Sour	1.5 km from the Nile	ca. 15,800m <sup>2</sup>	ca.2 m	60-70 cm	On a flat plain

Table 5.1.c. Aspects of Settlement Patterns among the Neolithic Sites of Central Sudan: White Nile and Gezira

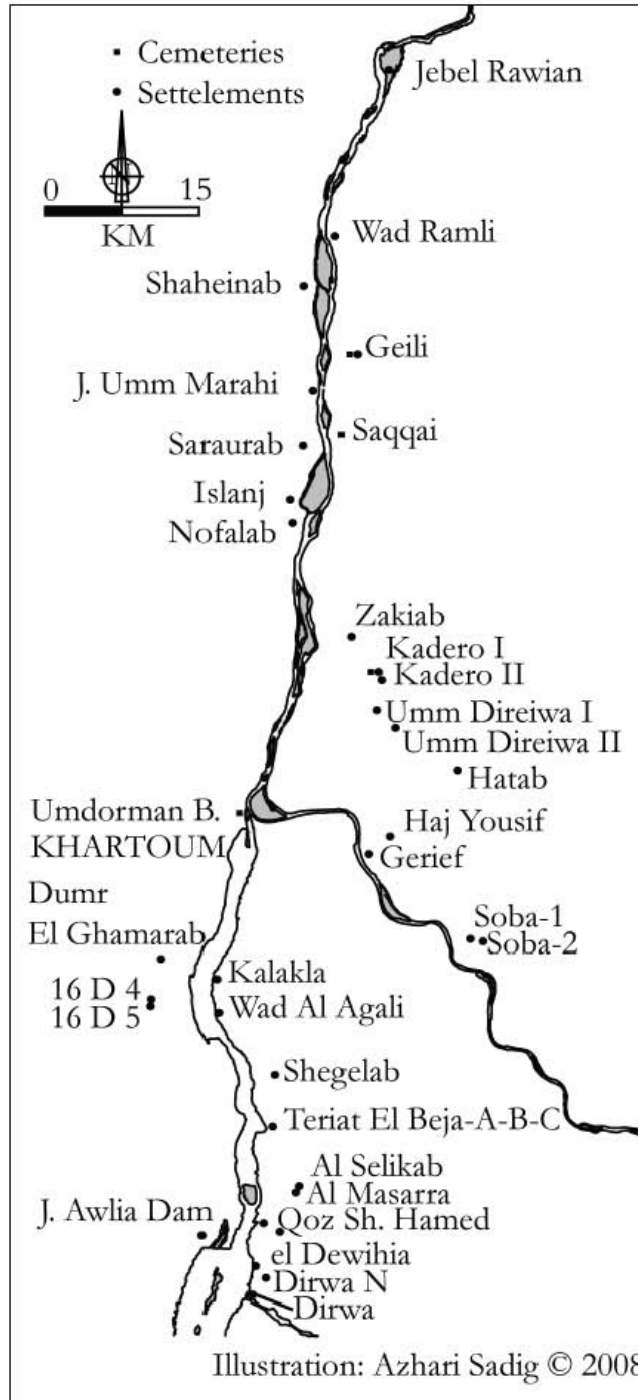
Site	Distance from the water system	Horizontal extent (in metres)	Elevation (in metres)	Average of depth (in cm)	Topographical location
Jebel Tomat	10 km east of the White Nile	10,000	0.5-0.6	Unspecified	Part of an old river bank of the White Nile
Rabak	3 km east of the White Nile	16,000	c. 3.5	60-80 (one Sq=150)	Part of an old river bank of the White Nile
El Kalakla el Teria'a	360 m from the eastern bank of the White Nile	unspecified	unspecified	unspecified	Located on an alluvial plain mound, a plain of clay mixed with sand
Wad Ela'gali	500 m from the eastern bank of the White Nile	unspecified	unspecified	unspecified	Located on an alluvial plain mound of mixed clay and sand soil surface
El Shegelab	2.41 km from the Eastern bank of the White Nile	unspecified	unspecified	unspecified	Located on an alluvial plain mound sandy clay plain area with sandy and clay low mounds mixed with organic materials
Teria'at el Bija (A):	1 km from the eastern bank of the White Nile	200x150	unspecified	unspecified	Located on an alluvial plain mound of sandy clay area which led to its easy erosion

Teria'at El Bija (B):	800m from the eastern bank of the White Nile	120x200	unspecified	unspecified	unspecified	Located on an alluvial plain mound of a sandy clay area, which led to its easy erosion
- Teria'at El Bija (C):	ca-800 m from the eastern bank of the White Nile	unspecified	1-2	unspecified	unspecified	Located on an alluvial plain mound of sandy clay area, which led to its easy erosion
el Selikab	7 km north of Jebel Awlia dam and 3.83 km of the eastern bank of the White Nile	unspecified	unspecified	unspecified	unspecified	Located on an alluvial plain mound of sandy clay area, which led to its easy erosion
Hilat el Sheikh Hamed	3 km from the eastern bank of the White Nile	unspecified	unspecified	unspecified	unspecified	Located on an alluvial plain mound
Hilat Wad Hamid (Qoz Hamed)	800 m from the eastern bank of the White Nile	unspecified	unspecified	unspecified	unspecified	Located on an alluvial plain mound
el Bija El Dewihia	About 200 m from the eastern bank of the White Nile	unspecified	unspecified	unspecified	unspecified	Located on an alluvial plain mound
- el Dirwa North	250 m from the eastern bank of the White Nile bank	unspecified	unspecified	unspecified	unspecified	Bank of the White Nile
el Dirwa	500 m from the eastern bank of the White Nile	unspecified	2	unspecified	unspecified	Bank of the White Nile
El Masarra	2000 m from the eastern bank of the White Nile	200x150	2,5-3	90-110	Alluvial Plain	

The sites are briefly mentioned according to region below.

## Khartoum Area (Map 5.1)

**Map 5.1: Location of Neolithic sites in Khartoum area**



## **West bank of the Main Nile**

### **Shaheinab**

The site is situated on an old riverbank on the west bank of the Nile ca. 30 miles north of Omdurman. It consists of a low mound, about 200 m long and more than 30 m wide, about half a mile west of the modern river bank. The Shaheinab site was the first Neolithic settlement to be excavated in the Khartoum area and it has showed evidence of a food-producing economy (Arkell. 1953).

### **Nofalab**

Nofalab site is situated on a gravel terrace on the west bank of the Nile 23 km north of Omdurman. The settlement is located ca. 650 m west of the present channel and covers an area of ca. 180 x 170 m (Magid. 1982).

### **Islang**

The site is situated along the gravel ridge near a permanent source of water, at a distance of about 25.5 km north of Omdurman. The topography of the site is the same as that of Nofalab. It covers an area of ca. 70 x 60 m. The depth of the cultural debris in the undisturbed squares varies between 0.40 m and 1 m, and only one trench reached a depth of 1.05 m (Mohammed-Ali and Magid. 1988).

## **East Bank of the Main Nile**

### **Geili**

The site is situated about 2 km from the eastern bank of the Nile and 47 km north of Khartoum. It occupies an area of ca. 150 x 180 m (2,700 m<sup>2</sup>), on a sandy clay mound. The mound rises to about 4 m above the surrounding plain. The stratigraphy of the site is complex, testifying to the fact that the site was exploited for a long period, both as a settlement and as a cemetery. Intervals must have separated the periods of its use, so the burials in the sites were often destroyed when new human group came to the site (Caneva. 1984).

### **Kadero I**

The site is located on a low, eroded mound of sand of about 18 km to the north of the confluence of the White and Blue Niles and 6.5 km to the east of the channel of the main Nile (Krzyżaniak. 1984: 309). The size of the site is ca. 30,000 m<sup>2</sup> and its occupation deposits rise 1.8 m deep in some places. A contemporary cemetery of hundreds of graves is associated with the settlement.

## **Kadero II**

This site is situated some 600 m to southeast of Kadero I and extends for about 10,000 m<sup>2</sup>. The site is slightly elevated on a natural mound not more than 50cm above the surrounding plain. Haaland, who surveyed and tested the site, considers it to be too eroded to be worth a large-scale excavation (Haaland. 1987a: 230).

A visit to the site in 1989 by Krzyżaniak revealed that Early Neolithic graves occurred in the part of the site being destroyed by intensive quarrying for construction material. The graves were furnished with Early Neolithic pots typical of the settlement and funerary pottery of Kadero I (Krzyżaniak. 1992a).

## **El Zakiab**

The settlement of El Zakiab site is located ca. 17 km north of Khartoum-North, on the eastern bank of the Nile and ca. 3 km from the main course of the river. It is situated on a small mound, which seems to be part of an old river bank of the Nile. The mound rises to a maximum 1.4 m above the surrounding fossil flood plain. The extent of the site is ca. 2,000 m<sup>2</sup> of which 100 m<sup>2</sup> were excavated (Tigani el Mahi. 1982; Haaland. 1987a: 26).

## **Um Direiwa I**

Um Direiwa 1 site is located on the alluvial plain about 7 km east of the present bank of the Nile, about 13 km north of Khartoum (Tigani el Mahi. 1982: 20). The extent of the site is ca. 90 m in an east-west direction and ca. 100 m in a north-south direction. Several parts of the site were destroyed by the activity of the local people who have removed the soil for building purposes (Tigani el Mahi. 1982: 20).

## **Um Direiwa II**

Um Direiwa II is situated about 3 km southeast of Um Direiwa I and at the same distance from the Nile: i.e. ca. 7 km away. It is located on the alluvial plain and the site is much deflated, there is very little more than surface debris left (Haaland. 1987a: 44).

## **West Bank of the White Nile**

### **Salha Area**

*El Salha Archaeological Project* has been the subject of archaeological and geomorphological reconnaissance and excavation in Central Sudan by the Is.I.A.O. (Istituto Italiano per l'Africa e l'Oriente) since the autumn of 2000. The concession revealed 160 archaeological sites (settlements and graveyards), ranging from the Lower Paleolithic to the Early Islamic period (Usai and Salvatori, 2002). Of particular interest are the many Mesolithic and Neolithic sites, which are often larger than 10 ha in size, located both along the Nile and in the interior along the edges of an Early and Middle Holocene lagoon or lake-like basin. This wide lagoon reached, at its maximum extension, in the Early Holocene, the slopes of the Gebel Baroka, 30 km to the west the Nile (Cremaschi *et al.* 2006).

Settlements of the Neolithic period, like 10-X-3 and 10-X-4, were found along the Nile bank, while only quartzite lithic workshops were located in the Jebel Baroka area (e.g. site 10-U-11A and B, 10-U-19) (Usai and Salvatori. 2002). Neolithic sherds were recorded in site 10-U-3, which was built on top of a natural mound 2-3 m in height, 10-X-8 and in el-Ushara site (10-S-4).

## White Nile

### Rabak area

The site of Rabak is located 235 km from Khartoum along the White Nile. The settlement was excavated in early 1983 (Haaland. 1987a: 45f). The site is located ca. 3 km from the present flow of the river, and it is elevated ca. 3.5 m. above the surrounding flood plain. The surface material is scattered over large area ca. 200 x 80 m. The cultural deposits were 60-80 cm deep.

## Blue Nile and Gezira (Map 5.2)

**Map 5.2: Location of Neolithic sites in Blue Nile and Gezira**

