Southern Africa and Its Environment

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Introduction

Southern African has enriched our knowledge of human evolution. Biological remains from the region has not only threw light on the anatomy and behaviour of hominids but had also contributed in the understanding of the extinct and extant fauna. This paper looks at the South African environment with emphasis on highlighting the unique features of the region.

Location

Southern Africa stretches from longitude 10ºS – 30ºS, latitude 10ºE – 40º East. It is bounded on the West and East by Atlantic and Indian ocean, in the North by Zaire/Central Africa and in the South by the Atlantic Ocean (Ojo and Duze, 1977). Politically, Southern Africa includes such countries as Angola, Zambia, Botswana, Zimbabwe, Mozambique, Swaziland (now Eswatini) Lesotho and Republic of South Africa.

Fig. 1. Location of Southern African countries

Climate, Soil, Vegetation, Relief and Geology

Southern Africa has a mild temperate climate, in the interior, the summers are hot and the winters are cool, with heavy frosts and snow in the mountains (Cannon, 1924).

Some parts of Southern Africa experiences the summer hot – mesothermal winter dry CWa type of koppen with a tropical savanna climate (AW) extending from Mozambique to the adjacent coastal plain. Through the Thonthwanite system it is known that drier lowveld is warm – mesothermal semi-arid with no water surplus at any season (Butzer *et al.,* 1972, Klein, 1976). The physical factors which appear to mainly control the climate are latitude, topography, proximity to the oceans and relation to regions of permanent low atmospheric pressure both to the east and to the west.

In terms of rainfall, local rainfall varies from 500mm in the low levels to 900m in the high lands with 75 – 80 of the precipitation received during the summer half year. A marked feature of the rainfall of Southern Africa is its periodicity. Temperature in the low level area indicates a warmest monthly mean January of 25 – 26^{o}C, a coldest monthly mean (June) of 16 – 18^{o}C and a mean annual range of 7.5 – 10^{o}C compared with a mean diurnal amplitude of 12 – 15^{o}C.

Southern Africa is drained by rivers Limpopo, Zambesi, Orange, Vaal, Cubango, Cunene, Cuando, Ruvuma and Luangwa (Ojo and Duze, 1977). Important lakes include Kariba, Ngami, Dow, Bangweulu, Malawi and Nweru.

Vegetation

Southern Africa can be divided into six ecological zones and these are Zambesian, Transvaalian, Kalaharian, Basutalian Karoo-Namaqualian and Cape ecological zones (Klein, 1976). Zambesian ecozone extends from more than 2,500km from West to East and 1,200 – 2,000km from North – South. Rainfall in the zone averages more than 500mm per annum in the summer months (December – May). Vegetation of the zone consists of tall grass intersped with deciduous trees that lose their trees in dry season. Dominant tree in the Southern part of the zone is Mopane (Colophospermum mopane), (Klein, 1976, Butzer *et al.,* 1972). During the upper Pleistocene and early Holocene, large grazing animals as Burchell's Zebra, Warthog and alcelaphone antelopes (blue wilde beest, harte beest and bastard hart-beest) were common in the Zambesian zone.

The Transvaalian zone is located on the Southern margin of Zambesian zone. Here rainfall is restricted to summer period and the average is less than 500mm per annum. The zone is sub-divided to three sub-zones – a Western zone, an Eastern zone and a narrow southern extension. In the Western portion, which is the driest part, the vegetation is mainly grassland with intersped shrubby trees amongst which *acacia* are dominant. Dominating the landscape in the area during the upper Pleistocene and early Holocene are grazers as blue wildebeest, cape hartebeest, tsessebe, cape buffalo, springbok, gemsbok, burchell's zebra and Warthog. Browsers are mainly greater Kudu, bushbuck, giraffe, black rhinoceros while mixed feeders are impala (Klein, 1976). The Western zone comprises Northern Namibia and Southern Angola.

The Eastern part of the Transvaalian is not only moister but also much denser with bush and tree cover. The larger mammals are basically the same as to the West but browsers and mixed feeders are more prominent numerically, as are grazers that prefer wooded country rean antelope, sabla antelope and buffalo. The Southern extension of the zone is covered by sub-tropical thorn bush and scrub forest in a sub-humid rather than semi-arid setting. The Kalaharian zone corresponds to that part of Southern African interior plateau that is often known as the Kalahari-desert, though it is not really a desert in either climatic or vegetational terms. The zone covers eastern Namibia, the western two thirds of Botswana, a large portion of the adjacent (northern) cape province of South Africa. Here, the vegetation is composed of trees and scattered bushland grass. Over the greater portion of the Kalahari, the general aspect of the vegetation is park-like. Towards the east, where the rainfall is higher and more regular the bush becomes denser and thicker. Thorn trees mostly species of acacia are the dominating feature of the bush.

Rainfall in the zone is erratic and it comes entirely in summer. Averagely it decreases from roughly 500mm per annum in the northwest to as little as 200mm in the south west (Klein, 1976, Flint, 1986). Highly porous, sandy soils soak up rainfall rapidly so that surface water is relatively rare even in areas where the average rainfall is fairly high. The vegetation cover is highly variable, from relatively luxuriant acacia savanna with an important grass component in the better watered parts (particularly in the North) to sparse shrub acacia savanna and bush veld in the more arid parts (particularly in the south).

Large mammals in the environment during the Pleistocene and early Holocene include spring buck, bush buck, cape buffalo and roan

antelope. Non-ungulates mainly hare spring hare, porcupine, baboon, rock lyrax. Carnivores are lion, leopard, cheetah, brown hyaena, spotted hyaena cape hunting dog and jackals. The Basutolian zone comprise the Drakensberg mountains and high plateau country adjacent to them. The zone covers southern trasvaal, the western natal, all of Lesotho, most of the orange tree state and a portion of the adjacent eastern cape province. The zone has climate characterized by warm, relatively moist summers (average precipitation generally between 620 – 750mm) and cold, dry winters.

East of the Drakensberg, the historic vegetation of the Basulotian zone was primarily open grassland with patches of temperate forest at the head of the river valleys and areas of acacia savanna at lower altitudes (Phillipson, 1978). West of Brakensberg, in the Highveld areas of South Africa, the vegetation was nearly pure grassveld with trees largely confined to river valleys. Large mammals in the zone during the upper Pleistocene and early Holocene include Burchell's zebra, quagga, black wildebeest, blessbok and springbok. Mixed feeders are widespread and also eland and steenbok. The karoo-Namaqualian ecological zone has two major components – the Namib desert which is a narrow strip up to 160km wide along the Atlantic coast extending from the mouth of the orange river through Namibia to beyond Mossamedes in Angola. The karoo which is a great plain stretching across the Cape province from the orange river on the north to the cape folded mountains on the south.

Namib is the most extremes deserts in Southern Africa. The average rainfall in the area does not exceed 130mm per annum and there are places where rainfall is less than 25mm. The Southern part of the Namib is a dune sea while the northern parts consist primarily of gravel plain and barren rocky hills (Phillipson, 1978, Klein, 1977). Karoo on the other hand is less arid than Namib with average rainfall varying between 130 and 400mm per annum. Over the whole of Karoo, rain come only in summer but in the southwestern portion as much as half may come in winter. The vegetation is low scrub with much bare ground in between a sparse scattering of grasses. Trees mainly acacia are confined to the river valleys. The Karoo generally has a semi-desert appearance, the vegetation is composed largely of xerophytic shrubs, shrublets and succulents. Trees are almost entirely absent except along the river-beds. The density of grasses increases towards the east, until the karoo merges more or less imperceptibly with the grassveild of the Basutolian region.

Animals commonly found during the upper Pleistocene and Holocene in the zone are rock hyrax, hares, springbok, gemisbok, black wild beest, steenbok, grey duiver and guagga. The last ecuzone, cape ecozone consists of the Cape folded mountains and the adjacent coastal plains. The Hamgklip separates the coastal plains into two main parts, the south-western Cape and the Southern Cape. The South Western Cape has a typically Mediterranean climate with wet, cool waters and hot dry summers. Southern Cape is marked by strong seasonal contrasts in temperature but rainfall tends to be more evenly distributed throughout the year (Avery, 1982), Annals of S/A Museum. The vegetation consists of much of funbos. Large gryshok and bush pig dominated the eco-zone during the Pleistocene and Holocene.

In terms of relief the Lebombo mountains (as an example) consists of up to 900mm of rhyolitic extrusions related to a N – S crustal fissure. The rhyolites according to Klein (1977a) are under and everlain by basalt sequences, and all pertain to the uppermost, stormberg series of the Karoo system adjusted rubidium – Strantium isochrous indicate an age of 191 ± 130 Y.B.P for the rhyolites. The eastern margins of the Lebombo are conformably overlain by late Cretaceous sandstones conglomerates and shales that dip below the undifferentiated, late Cenozoic sands of the Coastal plain. The lowveld represents a younger erosional surface which cut across the older karoo rocks. Specifically, stormberg basalts and ecca shales, no delimit the rhyolite escarpment so that creation of the lowveld depression can be attributed to differential erosion of the physically weaker shales and chemically weaker basalt.

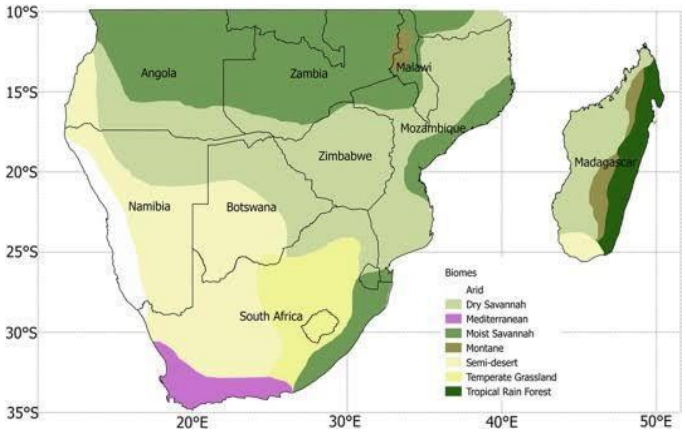

Fig 2. Vegetation map of Southern Africa

Quaternary Deposits in Southern Africa

Quaternary deposits occur along the South Atlantic and Indian ocean coasts of southern Africa – as well as the Kalahari basin, Vaal orange drainage basin and the Australo pithecine cave breccias (Tankard *et al.,* in Peters, 1987). In the Kalahari basin, the deposit is represented by thick basal fluvial conglomerates which are up to 90m thick and are cemented by caliche. According to Lancaster (1981) these are overlain by 180m of read shales and marls and duricrusts. The abundance of caliche crusts and dolomite in the Kalahari sands points to arid climate with saline conditions. In the etosha pan and other Palaeolake depressions, algal stromatalites suggest the presence of saline Kalahari lakes up to between 17,000 B.P.

Along the orange and vaal rivers are quaternary deposits which occur in a complex succession of alluvial terraces. Close to the confluence of the orange and vaal rivers mammalian bones including the Pliocene elephant Mammuthus subplanifrous artefacts suggest a Late Pliocene – early Pleistocene age for the oldest alluvial deposits which are caliche – cemented Cobblegrade conglomerates (Peter, 1987).

The Australopithecine cave sites of Taung, Sterkfontein, Makapansgat. Swartkrans and Kromdaa are well known for containing large number of hominid remains especially of the genus Australopithecine. The cases which occur in the Transvaal are of pre-Cambrian dolomites. The lithostratigraphy of the typical cave succession in the Sterkfontein cave reflects several different processes such as brecciation of cavern walls, carbonate precipitations, accumulation of insoluble cave earth and the flushing of colluvium into the caves. Hominids remains and fossils occur mostly in the carbonate-cemented colluvium and breccia (Sampon, 1974).

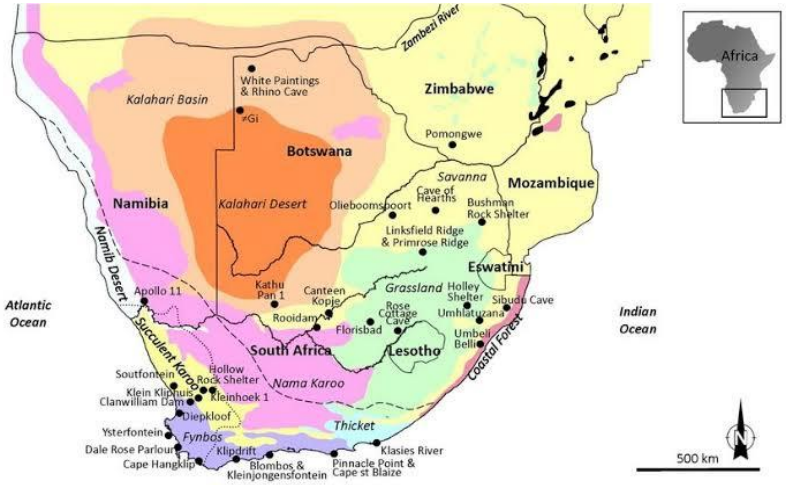

Fig 3. Map of Southern Africa with some archaeological sites (Credit: see Marlize Lombard)

Brain (1958, 1967) has carried out detained study of the evolution of caverns in dolomites and also proposed a system for classifying the breccias and other deposits found in them. For instance, the sterkfontein cave shows six sedimentary cycles each separated by a hiatus that may be associated with calcite or flowstone accumulation. Other than the Australopithecine cave sites, biological remains have been recovered from border caves which located at 27°19[1], 5", 30' 59" E within Kwazulu (or Zululand, annexed to Natal in 1897) 400m from the undemarcated border with Swazilands Conga caves, Klassies River mouth, Die Kielders, Nelson bay cave and Boomplaas cave.

According to Straus (1979) inspite of problems in terms of interpretation of the behavioural significance of levels and surfaces and also of stratigraphic resolution when dealing with caves and rockshelters, caves are unlike open air sites which have been subjected to more or less massive fluvial transport, deflation or other geomorphological processes which result in mixing, subtraction from the original archaeological deposits. More importantly, caves serve as fairly permanent post-depositional containers for the material residues of human occupation as well as provide permanent shelter for human groups.

Conclusion

The unique geographical setting of southern Africa perhaps served as attractive locales for hominids particularly Australopithecus whose remains have been recovered from Taung, Sterkfontein, Kramdaai, Makapansgat and Swantkrane. A synthesis of multiple proxies at sites in the Northern Cape Province of South Africa at the margin of the Kalahari Desert have produced updated interpretations of the paleo-environment of this region throughout the quaternary (Luckich & Ecker, 2022). Through these studies and many others by different specialists, it has been confirmed that the Pleistocene environment of the area is defined by open grassland vegetation within a system of active lakes, springs and rivers. The 'favourable conditions' early humans to live in the South African river valleys with deep, fertile soils filled with grasslands, floodplains, woodlands and wetlands that abounded with hippos, zebras, antelopes and many other animals, some extinct for millennia (Cowling, et-al, 2020). This savanna like vegetation is however rare in the modern landscape and would have supported the megafauna typical of glacial periods. The game animals found in the archaeological record, include a great diversity of grazing animals, including the now extinct Cape Buffalo and others which no longer occur naturally in this part of Africa such as giraffe (Cowling, et-al, 2020). This 'fertile environment' now referred to as the Paleo-Agulhas Plain (Cowling, et-al, 2020) had extremely high plant species diversity, as well as a greater variety of ecosystem and plant communities than currently found in the region.

The mild temperate climate of South Africa engendered the preservation of fossils, this is unlike the tropical climate regime of West Africa which is characterized by a combination of high temperature and abundant rainfall. The climate alternates between wet and dry periods. During the wet periods, there are heavy rainfalls which monthly mean may be about 1300m and in the dry season the rain stops, humidity becomes low and the temperature of the environment rises. The mean monthly temperature is within 25 – 28 degree centigrade.

This fluctuation in climate contributes in no small measure in determining the nature of the soil of the West Africa environment. The soil is acidic that is, it has a PH value of less than 7.0. Unfortunately for archaeology, such acidic soils cannot preserve materials especially organic matters. In other words, organic matters do easily undergo decomposition and decay in soils that are acidic in nature.

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