2. BACKGROUND

2.1 NATURAL SETTING

Sibudu is a rock shelter situated approximately 40km north of Durban and 15km inland on the Tongati River (Figure 2.1). The shelter is approximately 55m long and 18m wide and was formed during the penultimate Glacial about 160 000 to 140 000 years ago (Wadley & Jacobs 2004). The oxygen isotope record, from a deep sea core (RC17-69) off the KwaZulu-Natal coast shows two cold periods (Stages 2 and 4) and one warmer period (Stage 3- about 60 000 to 32 000 years ago) during the Last Glacial, an environment generally cooler than today (Wadley & Jacobs 2004). Today the site is screened within a remnant forest patch that survives due to the rugged cliff, which is not useful to sugarcane farmers (Wadley 2001). This vegetation type falls within the Indian Ocean Coastal Belt, specifically within the Tongaland-Pondoland regional vegetation mosaic (Wadley & Jacobs 2004). This regional mosaic consists of five main types of forest; described as undifferentiated lowland forest; sand forest; dune forest; swamp forest and fringing forest (Moll & White 1978). Sibudu falls within the undifferentiated lowland forest, called coastal forest by Lubke and McKenzie (1998), coastal bushveld-grassland by Low and Rebelo (1998), coastal forest by Acocks (1988) and coastal and riverine ecozones by Grant and Thomas (1998). The undifferentiated lowland forest (Type 23) develops from sea level to ± 300m and is evergreen with varying proportions of semi-deciduous species (Wadley 2001; Wadley & Jacobs 2004). The present day climate consists of a hot and humid summer with a mean average temperature of 22-25º C in January and a mean of 17-20º C in winter (July). Rainfall ranges between 250 mm in winter to about 750 mm in summer (Grant and Thomas 1998).

2.2 HISTORY AND EXCAVATIONS

Sibudu was first excavated in 1983 by Aaron Mazel from the Natal Museum. His excavation revealed Iron Age (IA) occupations from the 11th and 12th centuries AD with Middle Stone Age (MSA) layers below this (Wadley & Jacobs 2004). There is no evidence of a Later Stone Age occupation, with the MSA sequence beginning

immediately below the IA deposits (Plug 2004). Lyn Wadley began new excavations in 1998 that encompass 18 m^2 that lie ± 100m above the present day sea level (Figure 2.2). The southern entrance of the site is ± 12m lower so that the cave slopes north to south (Wadley & Jacobs 2004). The excavation grid is orientated along this north south slope, with the eastern part of the excavation being situated against the back of the cave. The grid is divided into 1 metre units, B, C, D and E with numbers 2, 3, 4, 5 and 6.

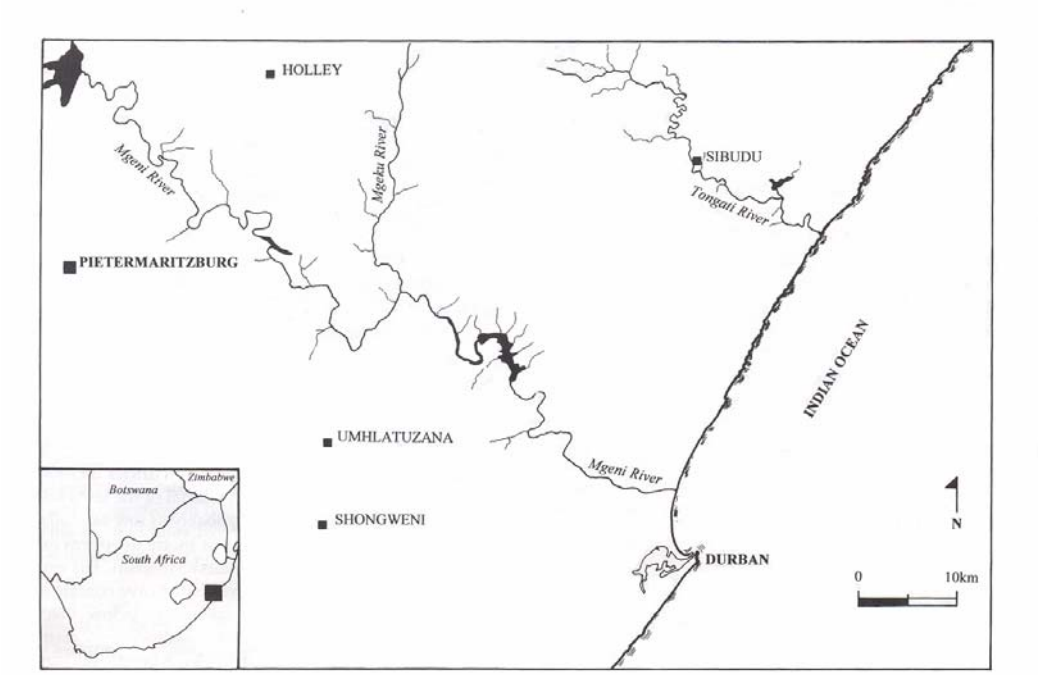

Figure 2.1 Position of Sibudu Cave (Wadley & Jacobs 2004).

To date, a two metre trial trench now over 2m deep has not exposed the cave's bedrock, suggesting that several metres of deposit await excavation (Wadley & Jacobs 2004). The remaining 16m^2 of excavation are at a depth of approximately 70 cm below the surface. The site is divided into 1m units that are excavated in 50 cm quadrants and the deposit is stack screened, firstly through a 2mm and then a 1mm mesh. The material is then sorted and bagged separately according to individual quadrants. There is a permanent datum line on the cave wall and the depth of each stratigraphic layer is measured from this datum (Wadley & Jacobs 2004).

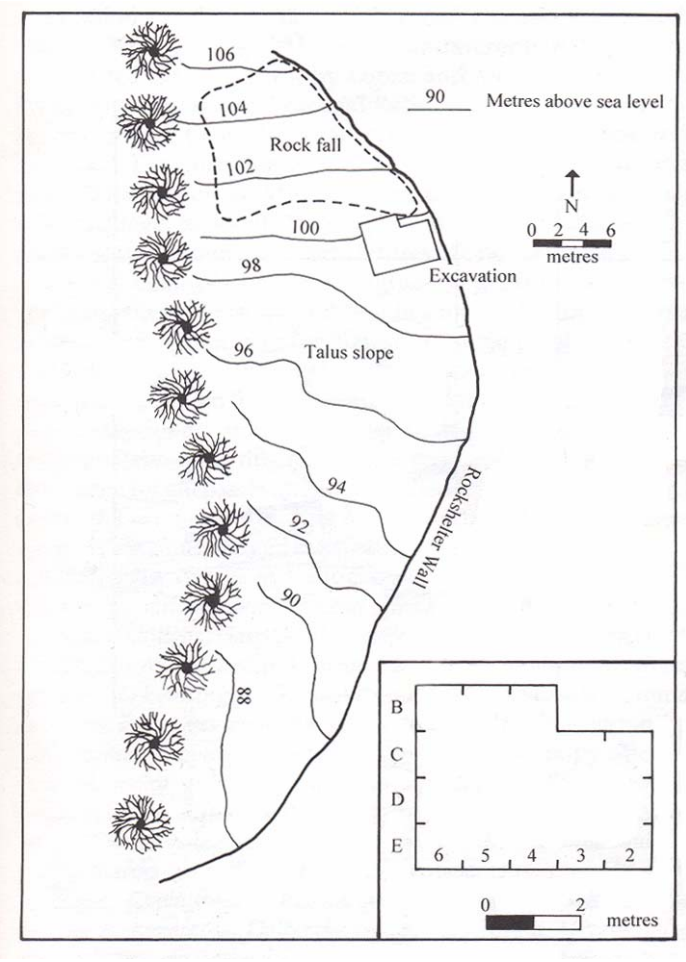

Figure 2.2 Plan View of Sibudu Cave (Wadley & Jacobs 2004).

2.3 DATING AND STRATIGRAPHY

The Sibudu stratigraphy is complex with distinct lightly coloured layers and palimpsests of hearths and ash lenses (Schiegl *et al.* 2004). The site contains distinct layers and is divided into a northern and eastern stratigraphy (Table 2.1). The eastern stratigraphy contains an extra set of layers that appear to fit stratigraphically between MOD and OMOD in the northern part of the excavation grid and between MOD and RSp in the southern part of the excavation grid (Wadley 2001). The layer RSp appears throughout the excavation and, as such, is a good marker layer for the site (Wadley 2001). The site is good for optical stimulated luminescence (OSL) dating, because of the brightness and size of the quartz grains in the deposit (Wadley & Jacobs 2004). Sedimentological analyses of six samples have shown the sediments to be poorly sorted and immature, suggesting that very little or no water transportation occurred in the cave (Pickering 2002). A large component of these sediments comprises

weathered roof-rock, windborne sand, microfaunal and owl debris, calcium carbonate and gypsum nodules (Wadley & Jacobs 2004).

Mineralogical studies of hearth and phytolith samples from the site show that ash is a major component of the MSA deposits, suggesting that the phytolith and mineralogical composition of the ash deposits are similar to the surrounding matrix (Schiegl *et al.* 2004). This evidence suggests that the sedimentary matrix contained fireplaces and ash deposits, whose structures were destroyed shortly after deposition (Schiegl *et al.* 2004). Analyses done on phytoliths display morphologies related to intense heat, suggestive of long-burning wood fires and possible reuse of the same fireplace (Scheigl *et al.* 2004). The mineralogical analyses provide evidence into the taphonomic processes and the use of pyrotechnology by the prehistoric peoples that occupied the shelter (Schiegl *et al.* 2004).

Although the majority of the MSA sites in South Africa have been shown to date beyond the effective range of ^{14}C dating, dating methods at Sibudu include ^{14}C dating on charcoal samples and OSL dating of sediments (Wadley & Jacobs 2004). ^{14}C dating provides an accurate dating of deposits no older than 40 000BP. OSL dates at can be used on sediments considerably older than 40 kyr (extent of ^{14}C dating) and in favourable conditions the method can be pushed back to 200 kyr (Jacobs *et al.* 2003). Table 2.1 provides an interpretation of the north and east stratigraphy of the Sibudu excavation.

2.4 PRESERVATION AND ENVIRONMENTAL DATA

Sibudu Cave is one of the few MSA shelters or cave sites in South Africa with good bone and organic preservation that has been studied in detail (Plug 2004). Excavations have revealed a deep MSA sequence with good stratigraphy and organic preservation. This good organic preservation allows for analyses of charcoal, seeds and bone, which in turn allow for environmental reconstruction between 26 000 and 62 000 years ago (Allott 2004; Plug 2004; Wadley 2004; Wadley & Jacobs 2004). These studies have shown vegetational changes through time with a rich and diverse animal population in the area (Allott 2004; Plug 2004; Wadley 2004; Wadley & Jacobs 2004).

Table 2.1 Current interpretation of stratigraphy in the north and east of Sibudu excavation grid. All dates are BP unless otherwise stated. (Wadley & Jacobs 2004).

Sibudu North stratigraphy	
BSV	
BSS	
MOD	26 000 ± 420 (^{14} C)
O MOD	51.8 ± 2.1 kyr (OSL)
O MOD2	40 898(38 397) 35973 BC (^{14}C)
O MOD2-BL	>45 000 (^{14}C)
G MOD; B MOD	
RSp	>41 000 (^{14}C) 53.4 ± 3.2 kyr (OSL)
YSp	
BSp	56.7 ± 2.3 kyr (OSL)
BSp2	
SPCA	
BL	
Or	61.5 ± 2.2 kyr (OSL)
Mi	
SS; Che	57.0 ± 2.3 kyr (OSL)
Eb	
Ma; MY	
BO; **P**; BP; OP; Iv; BM	59.6 ± 2.2 kyr (OSL)
Su	
Ch	
Su2	
Ch2	60.8 ± 2.3 kyr (OSL)
Y1	59.0 ± 1.9 kyr (OSL)
B/Gmix; BL2; BL3	
Bor; Ymix	
YA1	
Sibudu East stratigraphy	
BSV	
BSS	960 ± 25 (^{14}C)
Co	
Bu	42 300 ± 1300 (^{14}C); 35.2 ± 1.8 kyr (OSL)
LB MOD	
Es; Ore; PB; Ore2	
RSp; RD; Cad; Pu	>45 000 (^{14}C)
YSp	
BSp	
BSp2	
SPCA	
Not excavated further by 2002	

* OSL dates are in Bold.

Oxygen Isotope evidence from a deep-sea core (RC 1769) (Wadley & Jacobs 2004) taken off the KwaZulu Natal coast, shows two cold periods (Stages 2 and 4) with a warmer, wetter period (Stage 3 60-32 kyr) during the Last Glacial when the site was occupied (Wadley & Jacobs 2004). Evidence from this Oxygen Isotope record and from faunal, seed and charcoal studies suggest a significant shift in vegetation zones and a changing environment at the end of Oxygen Isotope Stage 4 and the beginning of Oxygen Isotope Stage 3 (Allott 2005). Seed and charcoal studies indicate that

between 60-55 kyr there was a change in the environmental conditions in the vicinity of the site (Allott 2005). These data suggest that the conditions were dry, cool and windy with many layers containing forest type species, indicating an environment comparable to that of today (Allott 2004; Wadley 2004).

Between 56 and 53 kyr, the palaeovegetation lies securely within Oxygen Isotope Stage 3, a warm stadial in the Last Glacial (Allott 2004; Wadley 2004). Data from charcoal and seed studies suggest that these layers seem to have a large semi-deciduous and deciduous component, with some species still present at the site today (Wadley 2004). Studies have shown that layers dated to this period contain vegetational elements that are representative of a drier more open environment (Allott 2005). Wadley and Jacobs (2004) suggest that some of these floral species, found in the MSA and not present today, imply that more northerly vegetational elements were once part of the region and that the local savannah was larger. Faunal studies have shown a predominance of savannah type species (tortoise and giraffe), suggesting drier more open conditions than today, supporting the idea of extensive tracts of savannah during the Last Glacial (Plug 2004).

The layer MOD, previously dated to 26 000 BP (C^{14}), now has an OSL date of approximately 50 kyr (Allott 2005). This level displays a greater diversity in savannah and bushveld taxa than those observed in the older deposits (Wadley 2004; Allott 2005). These layers contain a mixture of evergreen and deciduous species, suggesting either a forested or open savannah environment (Wadley 2004). Although most of the data suggest a large riverine component, the presence of certain savannah type taxa suggest that conditions were drier and the vegetation was more open than it was during the accumulation of the assemblages associated with previous occupations (Allott 2005). The extent or complexity of the forest component, within this biome, cannot be determined, but evidence suggests that the forested portions of this environment were not dissimilar to those found in the area today (Allott 2004). These layers show a mixture of taxa that may suggest a forested environment interspersed with open tracts of savannah.

2.5 CULTURAL MATERIAL

The rich cultural material from Sibudu includes a large collection of MSA stone tools and rare pieces of worked bone (Cain 2004; Lombard *et al.* 2004). This material consists of rare examples of small bifaces and hollow-based points (Lombard *et al.* 2004; Wadley & Jacobs 2004). Retouched tools found at the site include unifacial and bifacial points, straight and convex scrapers, scaled pieces and notches (Wadley & Jacobs 2004). Excavations in late 2002 revealed a Howiesons Poort Industry (HP), considered to be older than 61 000 years ago (Wadley & Jacobs 2004). The HP consists of backed tools, predominantly segments, manufactured on dolerite, accompanied by a higher proportion of blades (Wadley & Jacobs 2004). Residue analyses on the stone tools have shown remains of plant materials, suggesting that the cave occupants processed plants and may have used tools for multiple functions (Williamson 2004).

Engraved bone was recovered from the site in 2001 and was directly dated by accelerator mass spectrometer (AMS) to 28 880 ± 170 BP (GrA-19670). Cain (2004) describes the bone objects from Sibudu as heterogeneous both in form and manufacture but at present does not attribute any function. Residue analysis of the notched bone from Sibudu revealed no residues in the cut marks themselves, supporting this notion of a nonfunctional use (Wadley & Jacobs 2004). Bone artefacts have been reported at many other MSA sites (McBrearty & Brooks 2000; D'Errico *et al.* 2001), but none have been directly dated (Cain 2004). The resulting dates obtained for these artefacts form Sibudu are thus unique and may provide some insight into ancient cultures and better our understanding of our prehistoric human ancestors (Cain 2004).

2.6 SUMMARY

Sibudu Cave is an extraordinary MSA site with extremely good organic preservation. This good organic preservation has allowed for various different studies to be undertaken. These studies include faunal, phytolith, seed and charcoal analyses. Proxy environmental data from these studies suggest that the inhabitants of the cave experienced cooler, drier conditions than the present day (Wadley & Jacobs 2004).

Excavations have revealed a post-Howiesons Poort industry which currently has ten OSL dates (Wadley & Jacobs 2004).