AUTHORS:
Thomas N. Huffman[1]
Stephan Woodborne[1,2]

AFFILIATIONS:
[1]School of Geography, Archaeology and Environmental Studies, University of the Witwatersrand, Johannesburg, South Africa
[2]iThemba LABS, Johannesburg, South Africa

CORRESPONDENCE TO:
Thomas Huffman

EMAIL:
thomas.huffman@wits.ac.za

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New AMS dates for the Middle Iron Age in the Mapungubwe landscape

Research in the Limpopo Valley has documented over 500 Middle Iron Age sites (AD 900–1320) relevant to the origins of Mapungubwe – the capital of the first indigenous state in southern Africa. Fifteen new accelerator mass spectrometry (AMS) dates from 11 of these archaeological sites establish the boundaries of the ceramic facies that form the culture-history framework for such diverse topics as land use, ethnic stratification, population dynamics and rainfall fluctuations. Mapungubwe was abandoned at about AD 1320.

Significance:

- Because Mapungubwe developed relatively recently (circa AD 1200), it can clarify the origins of older states.
- Environmental factors such as droughts, along with agriculture and trade, played a role in the abandonment of Mapungubwe.

Mapungubwe was the capital of the first indigenous state in southern Africa, laying the foundations for Great Zimbabwe[1] (Figure 1). As with states elsewhere, external trade wealth and intensive agriculture were critical agents of change: they helped to transform a ranked-based society with hereditary leadership at the capital K2 into a class-based society with sacred leadership at Mapungubwe.

Archaeologically, Mapungubwe belongs to the Iron Age, a 1500-year long era dominated by Bantu-speaking farmers.[2] By convention, archaeologists divide this era into three arbitrary periods: the Early Iron Age (AD 300–900), the Middle Iron Age (AD 900–1300) and the Late Iron Age (AD 1300–1840). Characteristic ceramic facies form the basis of the culture-history sequence. Although problematic in terms of real cultural groups, it is another convention to apply the facies name to people who produced the style: thus, Mapungubwe people produced the *Mapungubwe* style.

For the origins of Mapungubwe, the most important period is the Middle Iron Age. Stratigraphic relationships for this period have helped to produce a definitive ceramic sequence (Figure 2): it includes the facies known as *Zhizo*, *Leokwe*, *K2*, *Transitional K2* (*TK2*) and *Mapungubwe*.

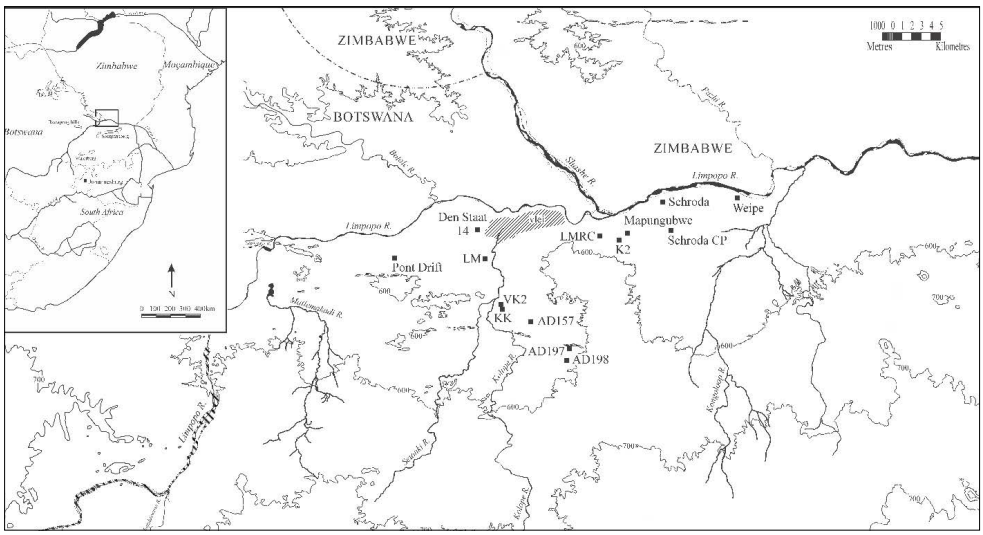


Figure 1: New accelerator mass spectrometry (AMS)-dated sites within the Mapungubwe landscape.

Origins of Mapungubwe Project

Since 1999, foot surveys in the Mapungubwe National Park and surrounding Buffer Zone have recorded some 1150 Iron Age sites. This large number has helped to clarify different land uses, ethnic stratification, population dynamics and droughts. As part of our project, we have processed 15 new accelerator mass spectrometry (AMS) dates from 11 Middle Iron Age sites and other researchers have produced a few more[3-5] (Table 1). We report them here by ceramic facies and research topic.

For Table 1, we first calibrated the BP (Before Present) dates using Calib 8.10 and the Southern Hemisphere data set (SHCal20) using Stuiver and Reimer[6] and Hogg et al.[7] This calibration programme includes the median age for the radiocarbon date, but this often falls outside the 1-sigma range.

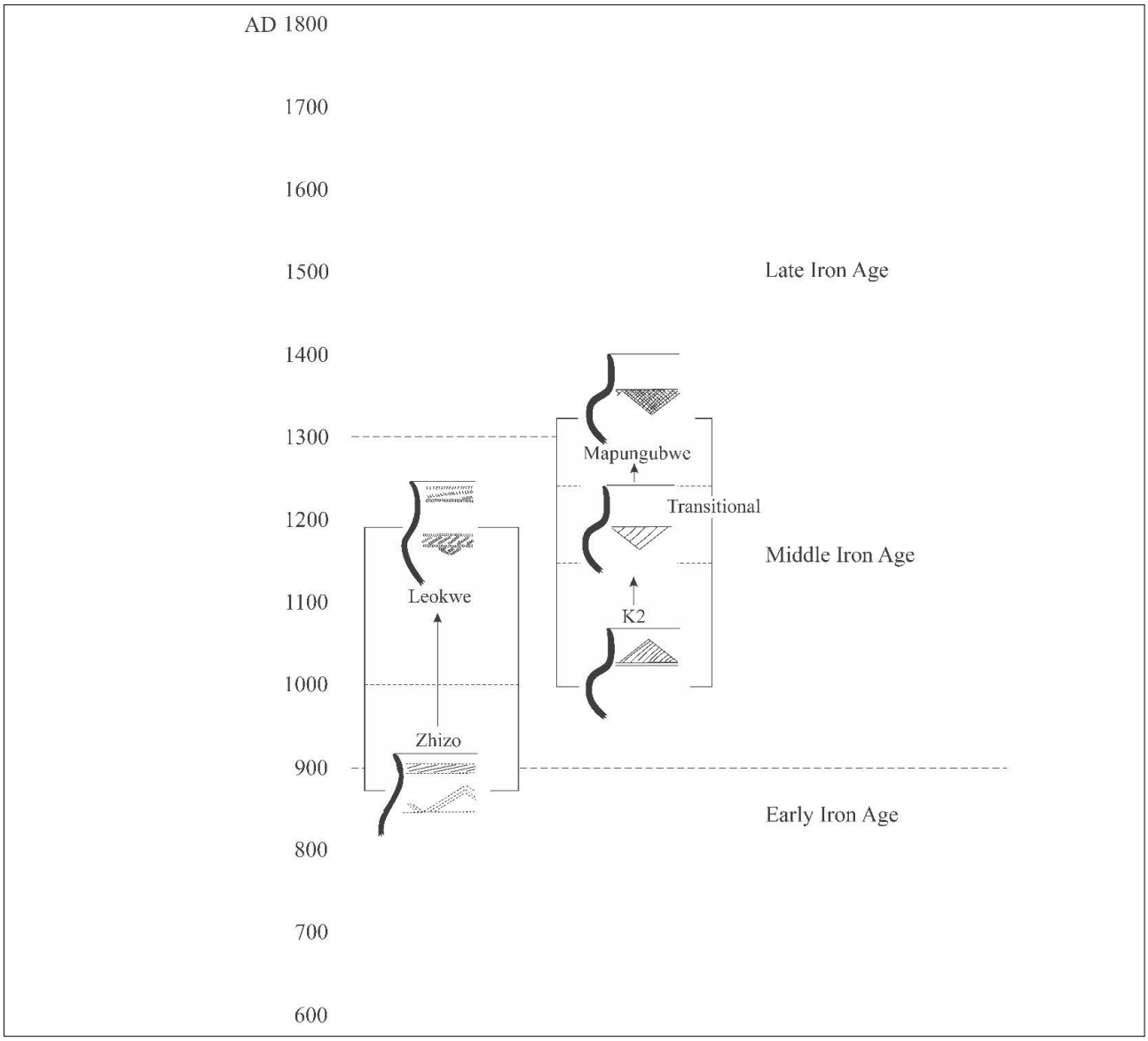


Figure 2: Ceramic sequence for the Middle Iron Age in the Mapungubwe landscape.

Furthermore, the radiocarbon curve fluctuates markedly during the Middle Iron Age, so that one radiocarbon result may have two or more possible calendar dates. To help choose between different calibration spans, we consider the midpoints of the 1-sigma ranges along with the known stratigraphic sequence and then order the possibilities. Thus, a hypothetical date of BP 1000±1 calibrates to AD 1033–1048 for sites with *K2* ceramics but to AD 1120–1137 for the *TK2* facies.

The Middle Iron Age

According to isotopic analysis, when Zhizo people moved into the Limpopo Valley from southwest Zimbabwe at about AD 900, the climate was similar to that today.[8] This means that Zhizo people would have found farming difficult, and some other reason probably accounts for their presence. Ivory artefacts and imported glass beads at Schroda[9,10] and the locations of other Zhizo sites[1] indicate that these people may have purposefully moved into the basin to hunt elephants for the ivory trade.

Land use

At about AD 1000, or slightly later, Leopard's Kopje people established their capital at the site K2 near the Shashe-Limpopo confluence in South Africa.[11] In contrast to the earlier Zhizo phase, Leopard's Kopje people began to cultivate the margins of the large vlei there (Figure 1). Models of vlei and riverbed cultivation in Zimbabwe[12] suggest that they planted sorghums in the rich loams along the wet edges and millets on the sandy fluvial terraces.[13,14] In typical farming homesteads, many grainbin foundations encircle a central cattle kraal (e.g. Liz 197: IT-C-2042; Edmondsberg 157: IT-C-2047). Besides these homesteads, some settlements were cattle posts located on spurs near springs on the escarpment, or otherwise well away from agricultural land (e.g. on Schroda: IT-C-2041). In addition, field camps were located near agricultural land but on small hills and rises in situations unsuitable for settled villages: they have granaries, small stock kraals and middens, but lack permanent housing and cattle kraals. Rainmaking hills are a fourth kind of site.[5,15]

Ethnic interaction

When K2 people took over the valley, many Zhizo people went west to Botswana to become the Toutswe group.[16] Some Zhizo people, however, stayed behind to live within the K2 interaction sphere.[17,18] Because their ceramic style has changed somewhat, it is called *Leokwe* after the hill where it was first recognised. A Leokwe site in the Venetia Reserve, KK110, upstream of the vlei, has been AMS dated (IT-C-2038) to the 10th century, somewhat earlier than most dates. Antonites[3] added three new dates for the Leokwe levels at Schroda, one of which is also early.

Table 1: New accelerator mass spectrometry (AMS) dates for the Mapungubwe landscape

Site	Lab. no.	$\delta^{13}C$	BP ± 1σ	SHCal20 1σ	Means
Mapungubwe facies					
Weipe508 VII/C$_1$/4	IT-C-785 charcoal	-24.0	660±52	1302–1362, ~~1380–1399~~	1332
Transitional K2 facies					
VK2	IT-C-730 post	-23.5	740±68	1235–1242, ~~1270–1322, 1350–1388~~	1239
–	IT-C-1498 post	-23.5	990±44	~~1032–1053, 1060–1070~~,1080–1150	1135
Den Staat 14B	IT-C-2040 charcoal	-23.0	1050±34	~~993–1009, 1014–1046, 1088–1105~~, 1123–1130	1127
Den Staat 14C	IT-C-671 wild seeds	-21.5	950±52	~~1046–1087~~, ~~1106–1122~~, 1131–1186, 1196–1209	1159, 1203
Liz 198 small kraal	IT-C-2037 dung	-13.8	930±27	~~1055–1058, 1072–1079,~~1152–1189, 1192–1211	1171, 1202
-IX/gb	IT-C-1500 charcoal	-26.4	960±42.6	~~1046–1088~~, ~~1105–1123,~~ 1130–1181	1155
-IV/midden	IT-C-2034 sorghum	-10.0	970±30	~~1045–1089,~~ ~~1104–1124~~, 1129–1157	1143
-IX/S/3	IT-C-2033 charcoal	-24.9	1010±28	~~1027–1048,~~ 1085–1138	1112
Little Muck 138	IT-C-2039 post	-23.7	960±27	~~1047–1086, 1109–1120,~~1134–1161, 1168–1180	1148, 1174
K2 facies					
Liz 197	IT-C-2042 dung	-12.7	1020±27	1024–1028, 1085–1112, ~~1117–1137~~	1036, 1099
VAD13/157	IT-C-2047 dung	-13.3	1090±27	991–1021	1016
Schroda CP	IT-C-2041 dung	-11.3	940±27	1051–1063, 1067–1082,~~1148–1186, 1198–1208~~	1057, 1075
Leokwe facies					
LMRC II/M/4-5	IT-C-733 charcoal	-26.7	960±50	1045–1089, 1097–1100, ~~1102–1124~~,-~~1129–1182~~	1067, 1099
KK II/H/3	IT-C-2038 charcoal	-24.4	1130±28	~~900–925~~, ~~967–993~~,-1008–1014	1011

Note: Crossed out dates were eliminated for stratigraphic or other archaeological reasons.

These dates show that *Zhizo* ceramics began to change into *Leokwe* when Leopard's Kopje people first moved into the valley. This contact represents the first 'ethnic stratification'[19] during the Iron Age in southern Africa. The new dates and ceramic analyses show that this relative status started at the beginning of contact, contra some interpretations.[17]

Although under the political authority of K2, Leokwe people maintained their own material-culture signature for several decades. It is common in such situations for earlier people to assume ritual roles: this gives them respect but not political power.[20] Among other tasks, Leokwe people probably supervised the initiation school[21] at Schroda.

Besides ritual specialists, Leokwe people appear to have herded cattle for K2 elite, as several Leokwe settlements have 'extra' kraals.[22] A large Leokwe complex (2229AB223/224) inside the National Park yielded a mid- to late-11th century date from the main midden (IT-C-733), placing it in the mid-K2 phase.

Universally, states tend to subsume ethnic differences in favour of a national identity. In this regard, a few *Leokwe* vessels occur in K2 and TK2 sites (presumably through marriage alliances), but not in Mapungubwe. A national identity thus appears to have replaced ethnic differences by the early-13th century when large-scale centralised authority was established, but before sacred leadership had fully materialised.

Population dynamics

As the state grew, so did populations. For population estimates, we need accurate spans for each facies. Until now, the boundary between *K2* and *TK2* has been unclear. Carbonised seeds from Den Staat 14C (IT-C-671), along with dates from Liz198 (IT-C-1500, IT-C-2033, IT-C-2034 and IT-C-2037), a burnt hut on Little Muck (IT-C-2039) and a burnt granary at VK2 (IT-C-1498) together show that *K2* ceramics transformed into *TK2* around AD 1150. *TK2* in turn became *Mapungubwe* about 120 years later, while *Mapungubwe* pottery lasted for about 50 years.

Using these new time spans, we assign 50 people (half of them adults) to each homestead, based on the Middle Iron Age burials at Kgaswe[16] in Botswana. We then assign 50 years duration to each homestead and divide the time span of each facies, and population, by the number of 50-year units. Thus, if 7650 K2 people (153 x 50) lived in the valley, then 2550 people (7650 ÷ 3) lived there at any one time. This formula determines general populations in relative terms rather than as an absolute census. In addition to ordinary people, total populations need to include the capitals (Schroda, K2 and Mapungubwe). It is likely, however, that K2 started as a small capital before reaching its maximum extent. We thus present the first 25 years of its lifespan as one half of a 50-year unit (2550 ÷ 2 = 1275 people) and then calculate the remaining population (7650 – 1275 = 6375 people) and duration minus that amount (150 – 25 = 125 years). Whatever formula is used, the K2 population was larger than Zhizo and over 10 000 people lived in the valley during the Mapungubwe phase (Table 2).

Table 2: Population dynamics for the South African portion of the Shashe-Limpopo valley

Phase	Homesteads	Time span	General population	Capital	Total
Mapungubwe AD 1270–1320	114	50	5700	5000	10 700
Transitional AD 1150–1270	143	120	2979	2500	5479
K2 AD 1000–1150	153	125 25	2550 1275	1500 300	4050 1575
Leokwe AD 1000–1200	63	200	787	none	787
Zhizo AD 900–1000	22	100	550	300	850

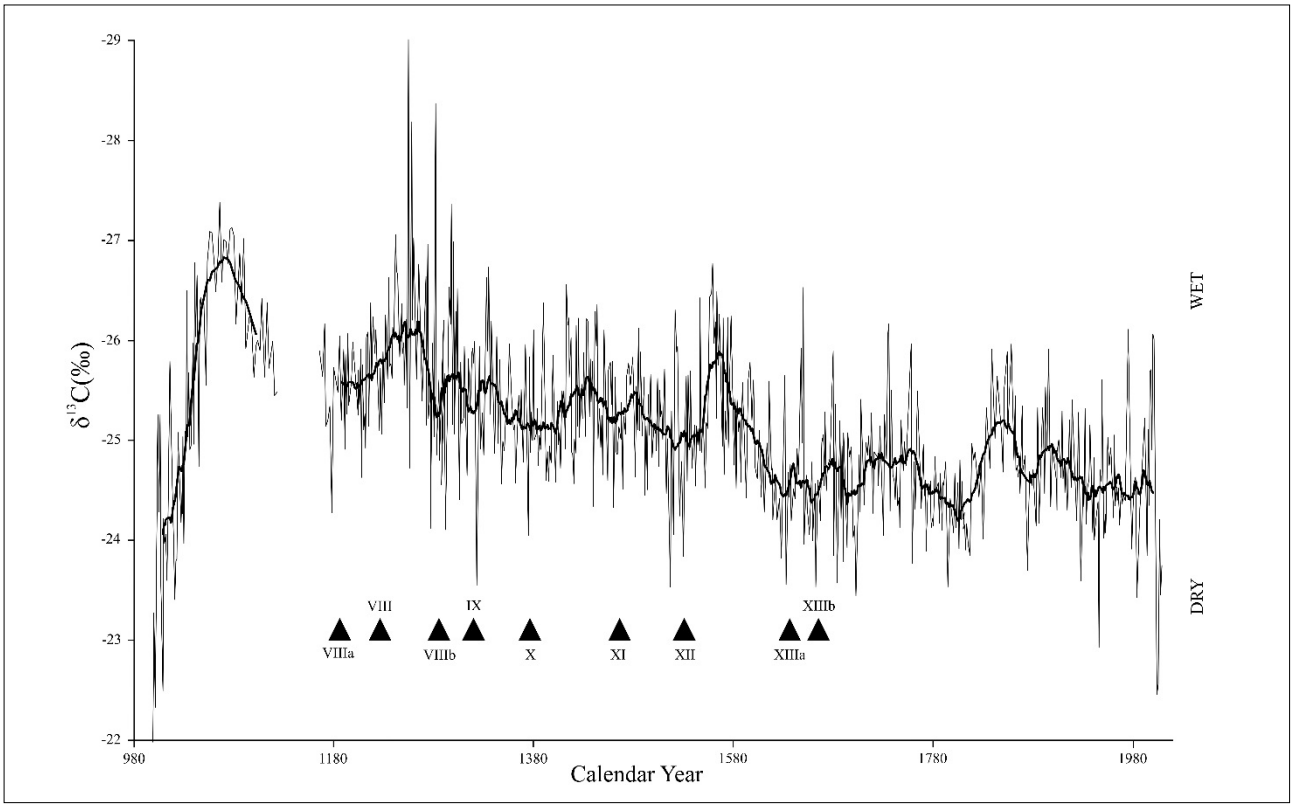
Number of sites ÷ 50 years x 50 people

Droughts and abandonment

Rainfall affected political stability as well as agricultural production. We know that some farmers burnt their grainbins as a ritual of cleansing related to severe drought (3–5 years in a row).[23] We first used the traditional radiocarbon method to date the burnings and droughts but fluctuations in the calibration curve confounded the results. We later added detailed baobab data (based on the isotopic component of successive growth rings)[24,25] that eliminate the multiple choices in the calibration curves. These data reveal a few droughts not previously noted (Table 3). One drought (Group IX) in particular contributed to the abandonment of Mapungubwe. The baobab sequence dates this important episode somewhat later than expected, to about AD 1310±5.

Following the principles of sacred leadership, the leader's right to rule would have been questioned as a result of this drought.[12] With Mapungubwe leadership in turmoil, Great Zimbabwe was able to seize control of the gold belt, the most important source of trade wealth, and Great Zimbabwe became the new centre of power. Thus, the 14th-century drought was an indirect cause of Mapungubwe's abandonment.

Table 3: Baobab climatic sequence and severe droughts recognised in the archaeological record



Group	Cal AD	Baobab cal AD
XIIIb		1660±5
XIIIa	1650	1635±5
XII	1530	1530±10
XI	1440–1450	1465±5
X	1350–1400	1390±10
IX	1300	1310±5
VIIIb		1285±5
VIII	1200–1250	1208, 1226, 1256
VIIIa		1185±10
VII	1020–1070	
VI	900–1000 (Two episodes)	

Dates from Weipe508 (IT-C-785, BP 650±52; and Pta-9549, BP 630±70) show that Mapungubwe people remained in the valley until about AD 1320 – the same date as the drought.

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Competing interests

We have no competing interests to declare.

Authors' contributions

T.N.H. directed the field work and S.W. the AMS dating. Both authors prepared the manuscript.

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