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Social implications of archaeology at Little Muck Shelter during the contact period: 150–1300 CE

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Little is known of forager behavioural shifts in the middle Limpopo Valley, especially after the arrival of farmers. Studies have shown changes in forager toolkits, as to what these represent is not clear. At Little Muck Shelter, toolkits remain similar, that is a dominance of stone scrapers, but upon closer inspection, the use of these toolkits changes slightly after the appearance of farmer communities in the region. Here we evaluate all findings at Little Muck Shelter to date and discuss how various discoveries indicate forager involvement in the local Iron Age economy. We argue that Little Muck was a specialised site for creating tools that could be used to obtain goods for trade from the onset of contact to the time when trade wealth was driving the appearance of wealthy elites and state-level society. It is also clear that the interactions between foragers and farmers in the Limpopo Valley is far more complex than first realised and that a great deal is left to discover. The findings demonstrate the need for careful conservation of archaeological resources and the curation of excavated materials.

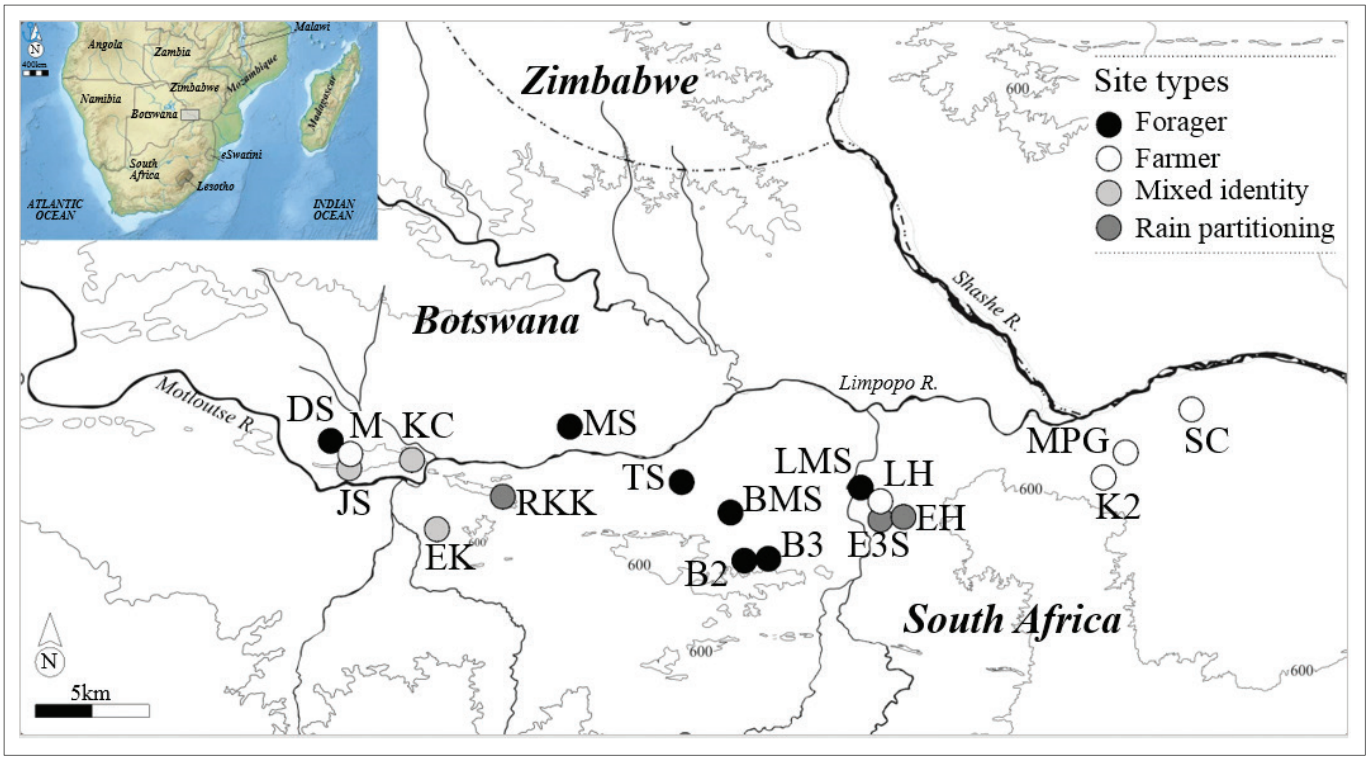
Keywords: Later Stone Age; Iron Age; trade; crafts; Southern Africa; middle Limpopo Valley; Bushmen economy.

Introduction

For near-on a decade, research in the Shashe Limpopo Confluence Area (SLCA) has largely focussed on sites of the Iron Age or farmer period (Figure 1). This is not surprising as this is where southern Africa's earliest state-level society appeared. Changes in farmer society emerged near the end of the first millennium CE when certain social features gradually formed and laid the foundation for future state-level development. These included the appearance of social hierarchies, the accumulation of wealth, divine leadership, craft specialisation, long-distance trade and physical changes to the settlement layout of the capital versus the homesteads of surrounding subsistence-based farmers (Calabrese 2007; Huffman 2015a, 2015b; Wood 2012). Significant among these was the growth of local and the appearance of long-distance trade networks, respectively, notably through the east coast (Chirikure 2014). Incoming trade items stimulated the local market economy, and it came to rely on a variety of goods, including ivory, rhino horn, feathers, shell, gold and cattle, in exchange for cloth, glass beads, bronze, copper, porcelain and more (Chirikure 2014; Sinclair 1987; Sinclair, Ekblom & Wood 2012). Trade goods were not only brought into the SCLA but into many other parts of central southern Africa. Glass beads and other goods have been found at sites in Botswana (Wilmsen 2014:409), Mozambique (Wood 2012), Zimbabwe (Chirikure 2014) and the Soutpansberg area in South Africa (Antonites 2014). Trade had a significant influence across the region, and this has been examined mostly from a farmer's perspective (but see Denbow 2017) even though foragers may have had more involvement than first realised (Sherwood & Forssman 2023). Here we use the term forager instead of hunter-gatherer as the latter term has often been associated with inferred gender roles (men the hunter, woman the gatherer), whereas the former has not. This seems too simplified. By using forager, one can bring to life the complexity of subsistence among these people and highlight the reality that gender roles in food procurement were likely not as structured. Rather, people would have been more opportunistic when food sources presented themselves irrespective of gender.

Only a handful of studies have been carried out at Later Stone Age (LSA), forager sites (Forssman 2020; Forssman, Seiler & Witelson 2018; Guillemard & Guillaume Porraz 2019; Hall & Smith 2000; Guillemard 2020; Van Doornum 2007, 2008, 2014). While these studies are gathering more data

Note: Special Collection: Celebrating Cultural Heritage within National Parks.



DS, Dzombo Shelter; JS, João Shelter; M, Mmamagwa; KC, Kambaku Camp; EK, Euphorbia Kop; RKK, Ratho Kroon Kop; MS, Mafunyane Shelter; TS, Tshisiku Shelter; BMS, Balerno Main; B2, Balerno 2; B3, Balerno 3; LMS, Little Muck Shelter; LH, Leokwe Hill; EH, EH Hill or Mbere Complex; E3S: E3S Hill; MPG, Mapungubwe; K2, Bambandyanalo; SC, Schroda.

FIGURE 1: The Shashe-Limpopo confluence area.

and providing a better understanding of forager behaviour in the valley, one aspect mostly lacking is an examination of the changes to forager stone tool technology and activities across the contact divide (see Guillemard 2020; Guillemard & Guillaume Porraz 2019). The impact that farmers, who were particularly involved in the creation of an economy based on trade, had on forager activities is not known.

Forager material culture typically includes the production of standardised stone tools (with an emphasis on stone scrapers and backed tools), worked bone implements (i.e. points or shafts) ornamentation made from bone and shell, fine-lined rock art paintings and a variety of consumed meat and plants (e.g. Deacon 1984; Mitchell 1997). In addition, forager material culture also includes organic materials such as hide, wood and plants. These, unfortunately, are rarely preserved in the archaeological record but referenced in ethnography (Bleek 1928; Lee & DeVore 1976; Hitchcock 2012; Marshall 1976; Schapera 1930; Silberbauer 1981; Wingfield 2003). Our contention is that when items normally associated with Iron Age farmers are excavated at forager sites, alongside forager material culture, it is reasonable to investigate possible trade relations between these groups of people. This can be done by determining if there were any behavioural changes that are reflected in the archaeology of forager sites from a particular point in time. It is this contention that is the bedrock for our research on the contact period between Bushmen foragers and Iron Age farmers in the SLCA. This study investigates the archaeological findings from Little Muck Shelter (LMS) to determine if any potential behavioural patterns are identified at the site after farmers arrived in the region.

Shashe Limpopo Confluence Area

Artefacts associated with the LSA in the SLCA date as early as 11 000 BCE, well before the first millennium CE appearance of farmers. Balerno Main Shelter (Van Doornum 2008) is so far the only known site that was occupied around this period. It remained habituated until the mid-Holocene when Tshisiku Shelter was inhabited (Van Doornum 2007). This happened after Balerno Main Shelter was abandoned, because of unknown reasons. Tshisiku Shelter is the only site that has been excavated in the landscape, which remained occupied until c.350 BCE. It was after this period that a host of shelters were used as residential camps by foragers, including the re-occupation of Balerno Main Shelter. Among these newly occupied shelters were Balerno 2 and Balerno 3 (Van Doornum 2005), Dzombo Shelter (Forssman 2014a, 2014b), LMS (Hall & Smith 2000) and Mafunyane Shelter (Forssman 2014a, 2016a). Although several unnamed open-air sites have been identified, none have been dated and their chronology is only estimated (Forssman 2013). These open-air sites have only been identified and marked through the use of GPS coordinates for potential assessments later.

The period from the final centuries BCE until 1300 CE can be divided into five phases based on social changes that affected forager ways of life in the valley (Forssman 2020). These phases are: (1) pre-contact period (pre-150 CE), (2) Early Iron Age (EIA) contact period, (3) Zhizo contact period (900–1000 CE), (4) K2 and Leokwe contact period (1000–1220 CE) and (5) Mapungubwe contact period (1220–1300 CE). Changes between these phases are observed through various means: (1) the introduction of farmer-associated

material culture, such as ceramics, glass beads and metal, in forager contexts; (2) changes in stone tool preferences and (3) a shift in residential habits, which included foragers living in farmer homesteads after 1000 CE (Forssman 2016b). The pre-contact period is marked by the appearance of Happy Rest (Bambata) ceramics (150–900 CE), where EIA farmer populations had expanded and spread southwards through Zimbabwe and Botswana into South Africa. Often, the K2, Leokwe and Mapungubwe phases are combined and collectively referred to as Leopard's Kopje period. Considering these two periods as a single contact period thus reduces the phases to a total of four.

Little Muck Shelter

Little Muck Shelter is a north-facing shelter that looks towards the Limpopo River floodplain. It is situated in a sandstone ridge that backs-up against the Kolope River to its south. The shelter is not very large: it has an opening of about 12 m, a depth that varies between 2 m in the east and 4 m in the west (Figure 2). The ceiling rises steeply and in the back of the western area is a recess with a shallow ceiling. The modest internal space is complemented by a large open-air area in front of a relatively flat ground that slants towards the east. Surrounding this area is exposed bedrock, upon which in some areas and in varying densities are engraved hollows, grooves, cupules and gaming boards. The shelter's backwall contains numerous rock art paintings produced by foragers. These include paintings of giraffes, elephants, antelope and human figures. The paintings also include a small painted panel of running humans in the far-western portion of the site in a small crevice. Little Muck Shelter is surrounded by several archaeological sites, many of which were occupied contemporaneously. The largest of these being Leokwe Hill, a residential farmer settlement on top of and surrounding a ridge located 1.5 km south-east of the shelter. It was, in fact, the proximity between these two sites that led Hall and Smith (2000) to excavate the shelter as they hoped to examine the outcome of close social relations between foragers and farmers. Their findings showed a tightly controlled series of changes at the site that included a notable increase in scrapers from the moment of contact with farmers. It was this change that inspired the need for further excavations at the site. We do not discuss the excavation results in this article, as these have been discussed in detail elsewhere (Forssman et al. 2023). Rather, what we do is to evaluate the research findings, as informed by experimentation we undertook to gain insight into the effect on the technology at LMS after the arrival of Iron Age farmers in the area and discuss elements that may be indicative of forager involvement in the Iron Age economy.

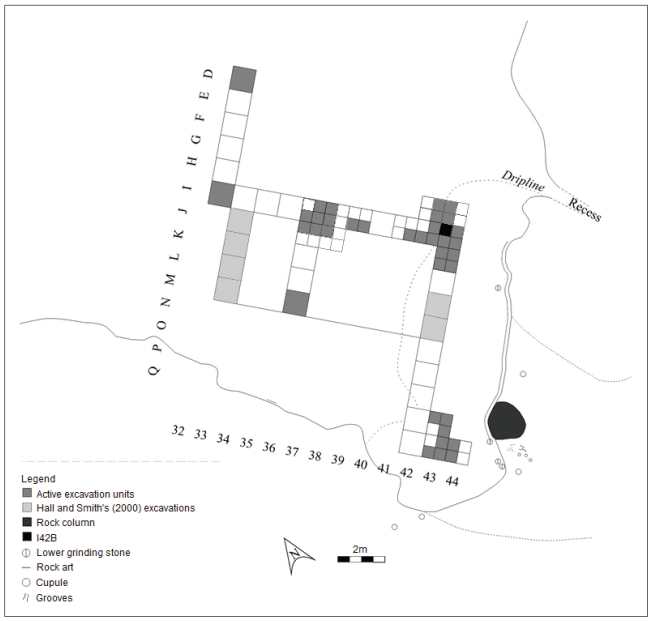


FIGURE 2: Map and excavation units. Light grey indicates Hall and Smith's (2000) excavations, and dark grey indicates renewed excavations from October 2020 to April 2022 by the Hunter-gatherer Archaeological Research Project.

Similarly to Hall and Smith's (2000) findings at LMS, our excavations have shown a dominance of scrapers at the site and a notable increase of scrapers not long after Happy Rest farmers had made an appearance in the region. Ethnographic records have equated scrapers with use in hide-working activities (Sahle 2019; Sahle, Negash & Braun 2012; Webley 1990), which directed many authors such as Deacon and Deacon (1980), Walker (1994) and Hall and Smith (2000) to conclude that LSA scraper implements are always likely used for hide work. This led Hall and Smith (2000) to conclude that hide working was the dominant activity at LMS and that these goods were traded for farmer items. These earlier studies did not perform their own replication experiments or use-wear experiments. As a result, we are of the view that their findings require re-evaluation.

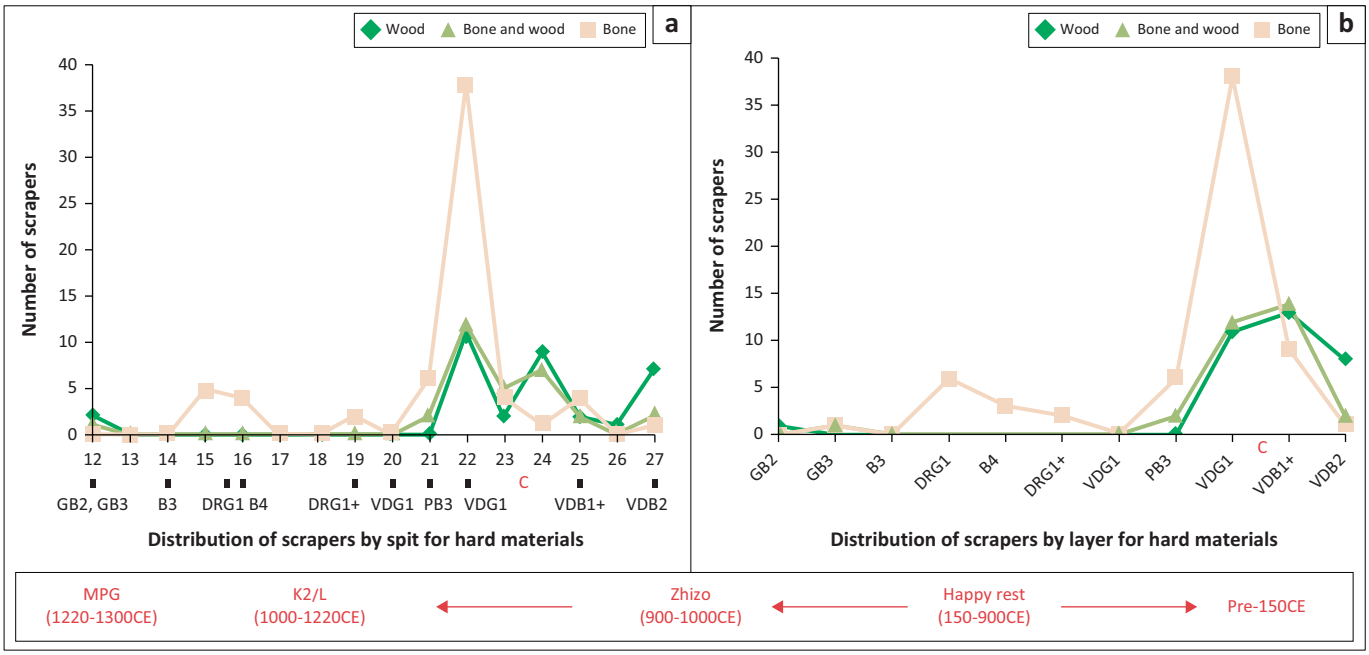
Understanding the function of a tool and the materials it was used to work is not a straightforward process. Tool morphology, once thought to be an indicator of its function, is not a reliable measure of use (Bisson 2000). Form, to the contrary, is often influenced by a complex set of factors, including reduction strategies (Dibble 1984, 1987, 1995; Dibble et al. 2017), raw material constraints (Rolland & Dibble 1990), blank morphology (Brumm & McLaren 2011; Guillemard & Guillaume Porraz 2019) or the tendency of a particular shape to be effective in a range of tasks (Latorre et al. 2017). Alternate means are required to confidently determine which materials a tool was used to work. Fortunately, experimentation, which was not applied in previous studies in the area, has shown that this goal is achievable through the investigation of use-wear; macro- and micro-traces that alter the tools' physical properties or preserve on the surface of a tool. Investigating use-wear can develop a far richer understanding of past activities and the use of certain materials (Binneman & Deacon 1986; Hardy & Garufi 1998; Kealhofer, Torrence & Fullagar 1999; Lemorini et al. 2016; Morales & Vergès 2014; Rots 2005; Rots & Williamson 2004; Rots et al. 2006). Moreover, many of the items worked in the past are not preserved, making the traces often identified on stone or other tools, the only analytical approach that can assist with the identification of their use.

A preliminary study examined the available 396 scraper specimens at LMS for various forms of use-wear including polish, edge damage and micro-fractures observed under low and high magnification. The analysis identified 195 specimens that presented evidence of wear or damage. From these, 109 appear to have been used to work rigid materials, which may include bone, wood, shell or ivory (Forssman et al. 2018), and only two specimens contained wear patterns consistent with hide working. This use-wear study was further able to show that LMS scrapers were not predominantly used to scrape hide, but instead were used on hard materials. However, it was not certain what specific hard materials were worked. This necessitated that another study be conducted along with experiments that used morphologically similar scrapers from square I42B to those found at the site to work different material types (Sherwood & Forssman 2023). Seven materials selected for this second study were those that were thought most likely to have been worked by LMS's occupants. Among these were bone, wood, ochre, ostrich eggshell (OES), tortoiseshell, hide and plant material. Four scrapers were used on each of these selected material types, with each being worked using a different motion: when hafted by pushing, pulling and back-and-forth, as well as freehand. Two hundred strokes were undertaken per motion on each material type, as the goal was to observe use-wear that forms from a specific material. This was increased up to 1000 strokes in instances where no use-wear on the scraper had formed after 200 strokes. The detailed experimental approach is presented in Sherwood and Forssman (2023). A Nikon SMZ 745 T stereoscope with a magnification of 50 X was used to observe use-wear on both the experimental specimens and the archaeological artefacts. It was determined that scrapers were used on both wood and bone prior to contact but with slightly more focus on wood than bone. After contact, during the Happy Rest phase, scraper use on wood remained similar but a sharp increase in pieces being used to scrape bone is noted, in fact, it more than doubled. Scrapers from this unit (I42B) then drastically decline in number with the few that are found during the Zhizo phase being only used to scrape bone (Figure 3).

The changes in scraper use also correspond with the appearance of items associated with farmers, such as ceramics, glass beads and metal. Some of these goods would later become important markers of status, prestige and wealth (Moffett & Chirikure 2016) and were the basis upon which state-level society appeared (Huffman 2015b). As such, their presence in a forager site at a time when they were marking elite groups and aided in establishing social hierarchies is conspicuous. It is likely that these items were obtained through trade but what we do not know is what foragers provided in return for these items. Studies at LMS are currently looking at the bone tools, OES beads, as well as other lithic tools, to gain insight into the effect on the technology at LMS after contact with Iron Age farmers and will be discussed in this article.

Methodology and results

Our major purpose in this article is to present unpublished data that we evaluate in conjunction with previously published findings from LMS. The common element in the LMS research project is to reveal possible hidden patterns in the data that can shed light onto behavioural changes within the broader landscape. It should be noted, however, that data studied thus far has been limited, in the sense of being



Source: Adapted from Sherwood, N.L. & Forssman, T., 2023, 'Macro use-wear identifiers on lithic scrapers and behavioural shifts at Little Muck Shelter, SLCA', *Journal of Archaeological Science: Reports* 49, 104034

Note: The contact period is represented by the C.

FIGURE 3: Distribution of scrapers used to scrape hard materials for I42B: (a) by spit and (b) by layer.

from specific units within LMS. It is a reality that work at the site may have shifted within the shelter itself during different time periods of occupation. Therefore, unit I42B alone cannot be seen to be representative of the site – or the region – as a whole. Looking at additional data, from LMS and other sites in the region, is paramount to help gain a clearer understanding of events at the site throughout time (Forssman et al. 2018; Sherwood & Forssman 2023).

Density data were examined for archaeological materials for units J42 A and B, both of which are next to I42 and are presented in Table 1 and Figure 4. The density data of lithics shows similar occupational phases as those observed in I42B but with an extra peak of intensity during layers PBG1 and PBG1+, which is not present in I42. This peak is also seen in Hall and Smith's (2000) data for squares L42 and M42 (Figure 5). The density of faunal remains corroborates this, as it correlates well with the lithics showing an increase in bone when there is an increase in stone, except for pre-contact layers, where faunal remains are lower in comparison to lithic densities (Figure 4). This can be explained by bone not being worked as frequently as pre-contact. This means that the square analysed (I42B) for specific scraper use-wear did not fully represent scraper use at the site during the Zhizo phase.

Following excavations undertaken by Hall and Smith in 1998, subsequent investigations at LMS were led by the Hunter-gatherer Archaeological Research Project (HARP). A count of all worked bone pieces at the site indicates that there was indeed an overall increase in worked bone pieces after the Happy Rest farmers entered the region and persisted well into the Zhizo period (Figure 5 and Figure 6). Preliminary investigation of the 233 pieces of worked bone shows that roughly 84% of these pieces are link shafts or points (referred to as needles by Hall & Smith 2000). Bone points and shafts in forager contexts are associated with hunting, as these were often used as arrowheads (Backwell, d'Errico & Wadley 2008). The distribution of worked bone pieces is shown in Figure 5 alongside those analysed by Hall and Smith (2000) and shows a similar distribution pattern. The largest amount of worked bone is found during the Happy Rest phase, followed by the Zhizo phase. The use-wear analysis of scrapers from unit I42B showed that scrapers from the Zhizo phase were all used to work bone. It is thus possible that scrapers found in other units (which are great in number for this time period) were also used to work bone. However, even though scrapers increased during this time period, there is a slight decline in the number of worked bone pieces, which could indicate that scrapers may have been used for other tasks as well (see Figure 3 and Figure 6). Unfortunately, the use-wear for this period was not captured to its full extent from unit I42B so their exact use is not known, but analysis of scrapers from Hall and Smith's excavations by Forssman et al. (2018) indicated that these scrapers were predominantly used to scrape ridged or hard materials, likely wood and bone.

TABLE 1: Artefact density from Square J42 A and B.

Strat.	Vol. litre	Stone tools	Fauna	Shell	Ceramics	Shell bead	Glass bead	Charcoal	Metal	Ochre
GB1	48.50	121.70	73.80	8.90	204.30	0.20	0.41	33.70	1.10	0.00
g/L	-	2.51	1.52	0.18	4.21	0.00	0.01	0.69	0.02	0.00
GB2	145.00	1282.30	560.50	68.00	597.70	0.70	1.17	39.40	0.40	0.00
g/L	-	8.84	3.87	0.47	4.12	0.00	0.01	0.27	0.00	0.00
DG1	3.00	7.80	4.00	0.50	0.00	0.00	0.00	0.01	0.00	0.00
g/L	-	2.60	1.33	0.17	0.00	0.00	0.00	0.00	0.00	0.00
GB3	52.00	992.40	357.60	196.30	187.90	0.31	0.22	5.12	0.00	0.01
g/L	-	19.08	6.88	3.78	3.61	0.01	0.00	0.10	0.00	0.00
PBG1	48.30	2454.30	613.20	312.10	427.30	0.10	0.30	6.05	0.10	1.10
g/L	-	50.81	12.70	6.46	8.85	0.00	0.01	0.13	0.00	0.02
PBG1+	8.00	1606.00	254.50	245.70	123.00	0.10	0.00	0.25	0.00	0.00
g/L	-	200.75	31.81	30.71	15.38	0.01	0.00	0.03	0.00	0.00
DRG1	36.00	1176.00	390.10	43.95	224.70	0.30	0.10	9.10	0.10	2.10
g/L	-	32.67	10.84	1.22	6.24	0.01	0.00	0.25	0.00	0.06
VDG1	37.00	5282.40	989.70	467.60	5.30	0.25	0.00	1.25	0.00	0.20
g/L	-	142.77	26.75	12.64	0.14	0.01	0.00	0.03	0.00	0.01
B2	43.50	1380.30	403.40	34.60	91.00	0.00	0.10	2.30	0.00	0.10
g/L	-	31.73	9.27	0.80	2.09	0.00	0.00	0.05	0.00	0.00
VDB1	22.00	2765.00	604.20	84.90	28.80	0.00	0.00	0.80	0.00	0.00
g/L	-	125.68	27.46	3.86	1.31	0.00	0.00	0.04	0.00	0.00
B2+	33.00	5827.30	918.70	387.50	28.70	0.10	0.10	0.60	0.00	0.00
g/L	-	176.58	27.84	11.74	0.87	0.00	0.00	0.02	0.00	0.00
VDB1+	31.00	10009.79	632.80	247.10	0.00	0.06	0.01	0.51	0.00	4.10
g/L	-	322.90	20.41	7.97	0.00	0.00	0.00	0.02	0.00	0.13
VDB2	230.50	28070.00	1665.10	230.92	0.00	0.05	0.25	11.30	0.00	102.35
g/L	-	121.78	7.22	1.00	0.00	0.00	0.00	0.05	0.00	0.44
Total	**737.80**	**60975.29**	**7467.60**	**2328.07**	**1918.70**	**2.17**	**2.66**	**110.39**	**1.70**	**109.96**
g/L	**-**	**82.64**	**10.12**	**3.16**	**2.60**	**0.00**	**0.00**	**0.15**	**0.00**	**0.15**

Source: Adapted from Forssman, T., 2020, Foragers in the middle Limpopo Valley: Trade, place-making, and social complexity, Archaeopress, Oxford.
Note: For each stratigraphic layer, the grams of material and grams per litre are given.

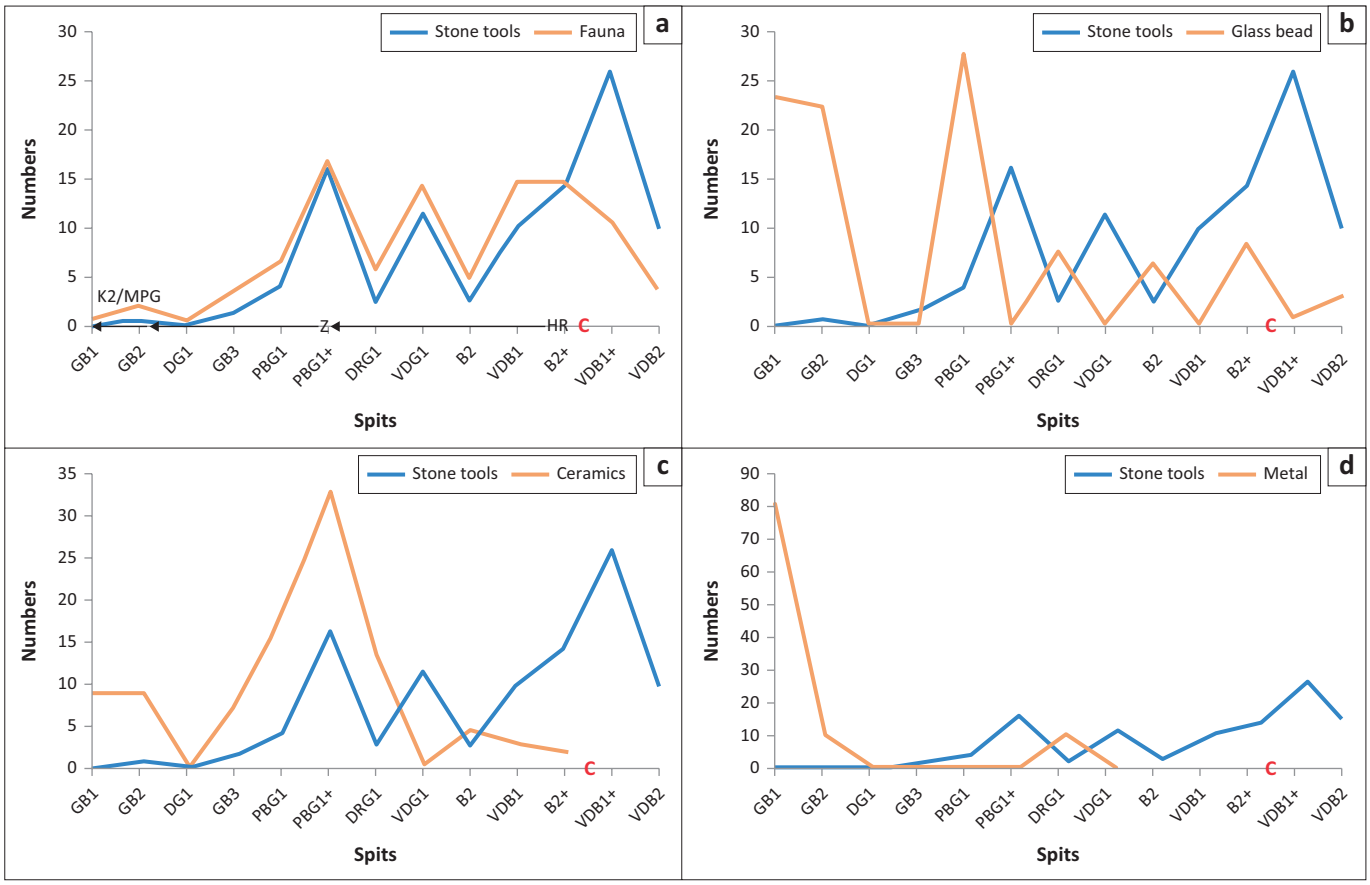
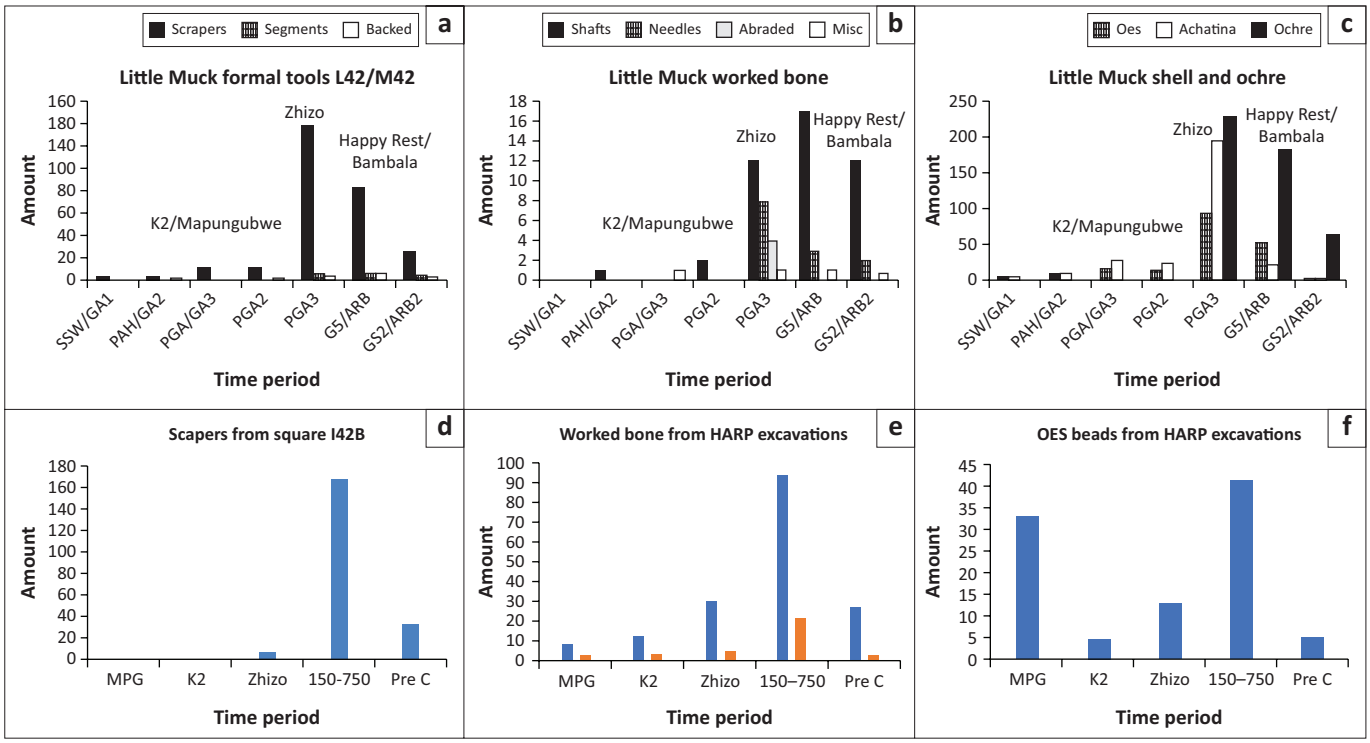


FIGURE 4: Densities of archaeological material from squares J42A and B relative to lithic densities per layer in these squares (grams per litre percentage): Stone tools versus (a) fauna; (b) glass bead (c) ceramics (d) metal.



Source: Adapted from Hall, S. & Smith, B., 2000, 'Empowering places: Rock Shelters and ritual control in Farmer-Forager interactions in the Northern Province', *South African Archaeological Society Goodwin Series* 8, 30–46

FIGURE 5: Scraper distribution for squares L42, M42 and I42B, as well as worked bone and ostrich eggshell beads excavated from Little Muck Shelter by Hunter-gatherer Archaeological Research Project to date.

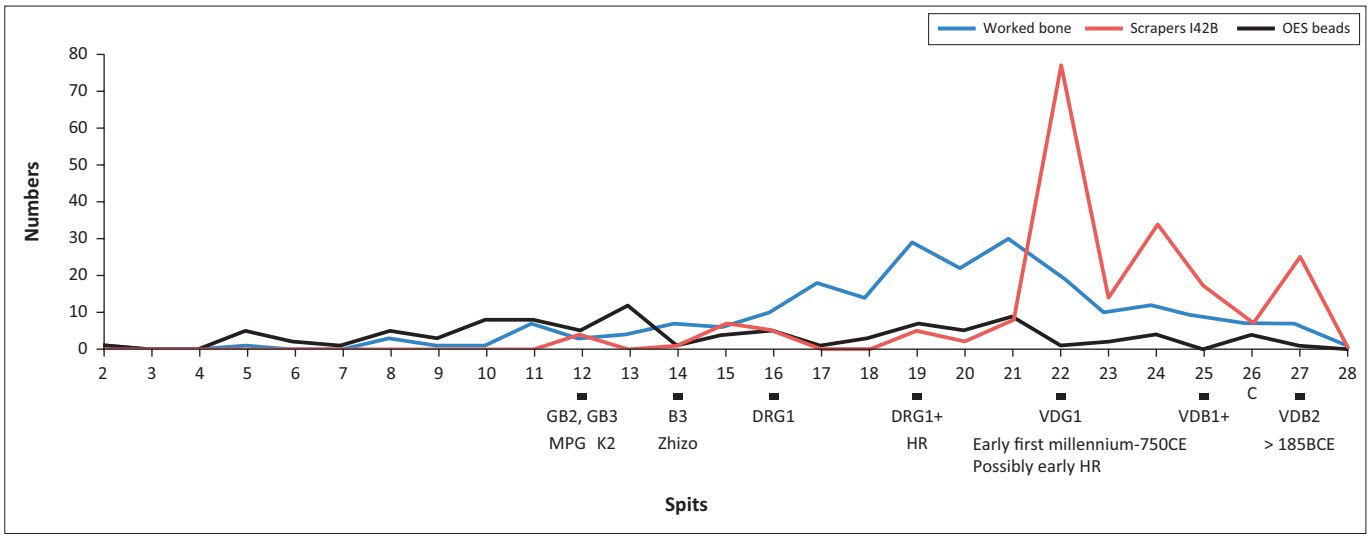


FIGURE 6: Lithic scraper numbers for I42B, worked bone pieces and ostrich eggshell bead counts from Hunter-gatherer Archaeological Research Project excavations at Little Muck Shelter, represented by spits (5cm depth) and phases for resolution.

Farmer-associated goods (ceramic, metal and glass beads) only appear after contact, except for a few glass beads that are found in lower levels. This might be because of post-depositional bioturbation, which can move smaller artefacts to lower units. Glass beads appear consistently after contact during the Happy Rest phase and increase after PBG1 (Zhizo), with a slight lag period relative to lithic densities (Figure 4). It is not certain why this period of lag exists or how extensive (in time) it is, but it might reflect the time between occupations of manufacture and occupations after trade. It could also be that smaller items are very susceptible to downward movements (possibly because of bioturbation or granular convection) in a succession, thus shifting the actual period of deposition up. It is also possible that this could represent occupations by two different groups of people occupying the site in alternating fashion, as glass beads are found at times when lithics are lower in quantity (this distribution pattern is also reflected for scraper numbers found in I42B, Figure 6). However, there is no evidence of farmer settlements nearby LMS during the Happy Rest phase (Huffman 2007:165) and if there were, those settlements have not been discovered or are buried. Thus, farmers may not have been as active in the SLCA yet, but foragers were. Lithic densities decline between more intensive occupations but do not fully disappear. In addition, worked bone at the site remains consistent and high during the Happy Rest phase (Figure 6) and other material culture remains unchanged and consistent with that of foragers up to the Mapungubwe phase, where farmer material culture makes a definitive appearance.

In addition, ceramics are consistently found at the site after contact (Table 1), but the most substantial amount is seen during the Zhizo phase alongside a peak in lithic density. Density data for J42 also show that a small amount of iron is present just prior to the Zhizo phase at the site, but the most substantial amount appears during the Mapungubwe phase. Lithic densities and forager material culture in general show a decline at LMS after the start of the Mapungubwe phase, making it likely that some metal implements seen during that time came from farmer groups active at the site, rather than trade relations. The metal implements present during the Zhizo phase also correspond with a decline in lithics at the site during that occupation, just like glass beads it could indicate different groups of people being active at the site or groups of foragers using the site for different reasons at different times, while bringing previously traded goods with them.

Ostrich eggshell beads are consistently present throughout LMS (Figure 6) and are normally associated with foragers. Interestingly, beads made from both pathways 1 and 2, as set out by Orton (2008), are present at LMS. However, pathway 2 only makes an appearance during the Zhizo phase and is most predominant during the Mapungubwe phase (Sherwood & Forssman in press), which could reflect either a change in bead-making strategy or occupations at the site by different groups of people. Nonetheless, plenty of beads made via pathway 1 are also present during these time periods, and bead manufacture follows a similar distribution to worked bone at the site, showing that both were made concurrently during occupations.

To sum up the findings, the most notable change in LMS's sequence is the sudden increase in scrapers just after contact with farmers, along with an increased and predominant use of bone. Worked bone also increases after contact, although the bone implements made are the same as those made before contact, in that they are bone points associated with hunting. Ostrich eggshell bead production remains consistent post-contact with an additional manufacturing technique (pathway 2) appearing during the Zhizo phase. Glass beads and metal appear in the sequence after contact and are present alongside forager material culture. However, this is at a period during which there was less activity at the site. Ceramics appear after contact and are visible throughout the succession with a period of absence just before the Zhizo phase. This is simply

because this unit did not have ceramic in that layer (VDG1), but ceramics are found in this layer and in other parts of the site.

Discussion

The findings to date at LMS, and other forager sites in the region, seem to indicate that trade relations might have occurred between foragers and farmers in the general SLCA region. Such analyses are informed by the presence of ceramics, glass beads and metal (generally associated with farmers) in forager contexts. In addition, LMS is thought to have been a manufacturing site for specialised crafts based on the marked intensification of these specialised crafts after contact. This provides further confidence in seeing the presence of such specialised crafts as a strong indicator that these implements played a role in the trading economy, either directly or indirectly.

However, the site alone cannot prove the extent and complexity of behavioural changes of foragers from the onset of contact. This is because human activities, especially those of forager societies, are not confined to one site, but entire regions and interconnected in ways that cannot always be seen through material culture alone. The best we can do with available evidence is discuss all possible conclusions based on the data and, where possible, infer potential behaviours. To address any potential behavioural changes at LMS, it is crucial to incorporate available data for the region (SLCA), as informed by previous studies in the area.

The frequency of backed stone tools at Dzombo Shelter (see Figure 1) increases and dominates the assemblage beginning in the early first millennium CE (Forssman 2014b). Examination of the artefacts' tips and cords shows that the increase in backed tools was accompanied by an intensification of hunting activities during the Happy Rest phase (Forssman 2015). At the same time, goods from farmer groups appear in the sequence suggesting trade in wildlife products, which is supported by a lack of change in the site's faunal record. By 900 CE (Zhizo Phase), hunting further intensified and became the dominant activity, but after 1000 CE stone scrapers dominated. A similar intensification is observed at LMS, with a sudden increase in scraper tools present during the Happy Rest phase. Another intensification was noted during the Zhizo phase. This is also followed by an increase in bone tools associated with hunting. Similar crafts (scrapers and bone tools) were being made at LMS before and after contact. However, there is an increased focus on the creation of bone shafts and points after contact, which could explain the increase in scrapers and their predominant use on bone. It is reasonable to assume that LMS was likely a site used for specialised crafts such as hunting implements made from bone and wood (bows and arrows) and OES bead manufacture. Whereas Dzombo Shelter might have been a site where hunted animals were taken frequently to process (dismembered, hide removed etc.) and divided among groups to take elsewhere or to trade, resulting in the remnants of backed tools showing hunting impact damage. Further studies of Dzombo Shelter would need to be conducted to demonstrate this with increased confidence.

Interestingly, LMS is largely surrounded by flat sandstone outcrops, which may have aided the craft process. Both bone tools and OES beads require an abrasive surface for their final shaping; thus this site may have been favoured for these craft activities as the natural outcrops would aid their manufacture. Scrapers are most useful for the initial cleaning of bone to remove dried tissue and sinew, as well as removing initial angular edges from split bone pieces. While going through the faunal remains of LMS to find all the worked bone pieces, it was apparent that a great deal of bone remains exhibit intentional splitting, some showing bipolar flaking. The final stages of rounding bone points and OES beads would require a rock outcrop of some sort, thus large flat fine-grained sandstone outcrops would be ideal.

There is also a rapid uptick in the frequency of LSA remains at other sites, particularly at Tshisiku Shelter, where the density of remains was on a decline but rose in the first centuries CE (Van Doornum 2007). The same trend is noticeable at Balerno 2 and Balerno 3 (Forssman 2020). Prior to contact few sites were frequently occupied in the SLCA, namely Balerno Main Shelter (Van Doornum 2008) and Tshisiku Shelter (Van Doornum 2007). Balerno Main Shelter is the only site that exhibits little change following contact with the farmers. It is possible that the reason for this continuity is the shelter's use as an aggregation site; an occupation phase in the forager cycle that involved groups aggregating at a site, feasting, performing rituals, bonding, arranging marriages and hunting (Van Doornum 2008).

The sudden increase and intensification of forager sites in the SLCA not long after the arrival of farmer groups is not a coincidence. This could be because of foragers either avoiding farmers who were settling in areas that were more conducive to farming practices, such as Soutpansberg (Hall & Smith 2000), or engaging with farmers for trade. Evidence for farmer settlements near LMS during the Happy Rest phase has not been discovered to date, and it is possible that farmers had not settled in the region, such as later groups forming the Leokwe Hill settlement, K2 and Mapungubwe. The presence of some goods associated with farmers (glass beads and ceramics) during this period indicates that some trade was indeed happening.

The concept of *hxaro* involves a system of delayed reciprocity among Bushmen foragers, where gift-giving was practised with the understanding of future exchange, friendship and partnerships (Marshall 1976; Mitchell 1996). This practice was usually reserved for blood relatives but was observed by Gordon (1984) to be practised between Bushmen and other ethnic groups in Namibia and Botswana. Trade between forager groups dates to many tens of thousands of years (Miller & Wang 2022; Stewart et al. 2020) and seems to be a very important survival behaviour. It is not unreasonable to

assume that Bushmen foragers in the SLCA would extend such a concept to other ethnic groups upon first contact or encounters, as such a gesture would help diminish any newly introduced competition for resources on the landscape and aid both groups of people.

It is possible that forager groups that came across farmers in different parts of the region (Soutpansberg) moved into areas not occupied by the latter (i.e. Limpopo Valley) to avoid competition for everyday subsistence. While in these areas, foragers made and collected goods that could be later traded or used for hunting in other parts of the region closer to farmer settlements. Some goods could thus have been acquired near farmer settlements, traded, divided and shared among members or groups and eventually brought back to LMS (and SLCA). This cycle may have been repeated to the extent that LMS could have been periodically occupied for craft specialisation intended for trade relations, while at other times occupied for forager needs only (Figure 6). It is also possible that during the periods of intensification, members with craft specialisation in bows and bone arrows from different groups aggregated to manufacture these implements although this cannot be proven. During times when activity drops, the site may simply have been used by a group of foragers while in the area for their own subsistence or crafting needs. This seems more likely as there is no evidence of farmer settlements during the Happy Rest time period nearby LMS. Despite that, it is still possible that farmers or pastoralists may have used the site in between forager occupations. However, evidence of such in the form of seeds, domestic faunal remains, structures or other farmer or pastoralist-associated goods (except for ceramics and glass beads) is absent, but forager material culture is present and similar to previous and subsequent technology.

It was during the Zhizo phase that farmers settled closer to LMS. This resulted in another phase of craft intensification at LMS and more farmer goods entering the site, including the appearance of metal. Metal and glass beads are seen as wealth markers in certain farmer contexts (Moffett & Chirikure 2016). Because these items are quite abundant at LMS during this phase, the notion that this site was a trade centre during the Zhizo phase is not unfounded. Foragers likely continued trade relations that were built up over the last few centuries and participated in the trade economy at that time. While this has not been established from prior literature, evidence analysed here suggests continued trade over time. Thus, foragers were present during the rise of state-level society, which we could conservatively push back to the late first millennium CE when Zhizo farmers appeared in the valley. This period represents the initial phases of trade and change in social processes, which were later linked to state formation. In the coming centuries, these items came to play an important transformative role in farmer society. Social elites emerged and one of the key factors distinguishing them from others in the developing hierarchy was wealth in prestige goods (Calabrese 2007; Chirikure 2014). This would ultimately lead to Mapungubwe royalty accumulating large reserves of wealth (Huffman 2015b). Therefore, goods traded to farmers by foragers essentially aided in the long-term wealth and growth of farmer communities, especially if exotic items collected, hunted or crafted by foragers were subsequently traded by farmers to the East to acquire other items associated with wealth.

Not long after the rise of Mapungubwe (from about 1300 CE), forager activity at LMS (and most of SLCA) starts to disappear and farmer activity replaces forager lifeways at the site (Hall & Smith 2000). This could indicate a few possibilities. Firstly, there is a possibility, which cannot be proven yet, that foragers left the SLCA to occupy expanses further away from farmer groups because of influences on their society that started to change their identity as a people. Secondly, foragers slowly assimilated into farmer communities or, most likely, a combination of both. It has been documented that certain groups of foragers shifted their settlement patterns after contact for trade or labour purposes and lived close by or in a homestead (Guenther 1986; Macquarrie 1962; Maggs 1980; Whitelaw 1993; Whitelaw & Moon 1996). This possibly started as an integration into 'traditional' forager seasonal movements, where at certain times of the year foragers would spend time near farmers for trade or labour and other times reverting to a 'traditional lifestyle' (Wadley 1996). This resulted in a decline of LSA artefacts in various rock shelters such as seen in the northern Drakensberg (Whitelaw 2009). Forager interactions with farmers might have gone further than trade in the form of marriage and thus some genetic integration into farmer society. Mosothwane's (2010) analyses of a female skeleton in a farmer settlement suggest that this individual had been living a hunter-gatherer lifestyle but came to rely on agriculture.

Conclusion

It is clear that something changed in the valley, and extended region, impacting forager ways of living. The only major event corresponding to these changes is the arrival of farming communities becoming increasingly active in and around the SLCA. We can conclude that forager wares and services were of value, and this was enough to warrant their inclusion in the trade economy even though it meant supplying them with important prestige goods. The goods obtained from foragers by farmers may even have been traded by these communities through the east coast of Africa and made their way towards Asia and Europe, such as unworked pelts, animal horns, traditionally crafted hunting implements or works of art, thus extending their influence abroad. As such, foragers at LMS were active within the local market economy. Changes observed at farmer settlements from 900 to 1220 CE were driven by factors including the growth of political authority, centralisation of initiation and other ritual activities, specialisation and a developing trade network (Huffman 2015a). The latter is deemed significant as it led to elite groups owning larger reserves of prestige items. Therefore, these various items were important social markers. It is unfortunately not clear how obtaining these goods would have affected the internal hierarchy within forager communities.

The evidence we have so far does not create a full or clear picture of events and changes that may have occurred in the

area, nor the impacts these events had on forager lifestyles. To fully understand these events and their inherent complexities, excavations and in-depth research of forager and farmers sites in the SLCA are needed to refine specific chronologies and look for broader patterns in the data that might appear. It is possible to do so by examining trace evidence on bone and stone implements found at forager and farmer sites. It would also be worthwhile exploring additional sites that may reflect their own idiosyncratic responses to contact. Both LMS and Dzombo Shelter, where interesting change is apparent, are near large farmer settlements. Investigating other sites in similar contexts might reveal other forager reactions to farmer interactions and fully demonstrate the various roles foragers played during the rise of state-level society. For now, though, the findings from LMS neatly show that foragers responded to contact by altering their own activities and production habits to some extent to participate in the local market economy.

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Competing interests

The authors declare that they have no financial or personal relationships that may have inappropriately influenced them in writing this article.

Authors' contributions

N.S. conceived the study and prepared the document herself. T.F. oversaw the study and attributed to edits and provision of density data.

Ethical considerations

This article followed all ethical standards for research without direct contact with human or animal subjects.

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Data availability

The data that support the findings of this study are available on request from the corresponding author, N.S.

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