Documenting skills and practices of dry-stone masonry at Great Zimbabwe: Towards capturing a fading material knowledge

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Abstract

The preservation of Great Zimbabwe, a dry-stone masonry-built archaeological site in southern Zimbabwe, is anchored by two diametrically positioned conservation approaches; one inspired by modernist conservation practices and the other by local knowledge and skills. In Zimbabwe, dry-stone masonry is a skill and practice embedded in the local knowledge epistemologies. There are no formal institutions that train dry-stone masons. It is largely believed that the dry-stone masonry knowledge and skills have been inherited from the ancestral builders of the ancient dry-stone-built settlements predominately found in Zimbabwe, with some few in the neighbouring countries of Botswana, Mozambique, and South Africa. Only a few dry-stone masons are skilled in restoring these ancient structures. The knowledge and practices of dry-stone masonry have never been recorded in detail, not only in Zimbabwe but also in other southern African countries where these monumental stone buildings are also found. This paper discusses the findings of a documentation project of dry-stone masonry at Great Zimbabwe, conducted under the auspices of the British Museum's Endangered Material Knowledge Programme (EMKP). The project created a digital archive designed as

a repository resource for the conservation, transfer and dissemination of indigenous dry-stone masonry knowledge and practices.

Keywords: *Dry-stone masonry, Great Zimbabwe, Restoration, Stonemasons*

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Introduction

Knowledge is a strategic resource (Freeman, 2001). However, in the Global South, as could be the case elsewhere, the indigenous knowledge, skills and practices of conserving different kinds of tangible heritage are under threat. Fueling this situation are the effects of colonialism, globalisation, modernity, and Christianity, among other alien systems and practices that have largely resulted in the alienation of local heritage conservation philosophies and practices in many African countries (Pwiti, 1996; Ngulube, 2002; Bruchac, 2014; Ichumbaki, 2016; Ndoro *et al.,* 2018). This paper presents and discusses the findings of a research project that focused on documenting indigenous knowledge, skills and practices of dry-stone masonry at Great Zimbabwe. The project was conceptualised and implemented under the auspices of the British Museum's Endangered Material Knowledge Programme (EMKP), funded by the Arcadia, a charitable fund of philanthropists Lisbet Rausing and Peter Baldwin, United Kingdom (https://www.emkp.org/).

Dry-stone masonry is an expansive term encompassing many techniques, including quarrying, construction, and repair of stone structures built without mortar or any binding materials. The stone masons usually acquire the knowledge and skills after spending a considerable time as apprentices, mastering the hands-on skills and techniques of the work McGibbon (2018: 10) described as 'not possible to teach from a book'. Dry-stone masonry as a practice and artisanal skill is as old as the stone itself, and it is practised worldwide (Walker *et al.,* 2000; Post, 2005; McGibbon, 2013; Chirikure, *et al.,* 2015; UNESCO, 2018). In southern Africa, ancient dry-stone masonry is attested by over 600 structures of varying types and sizes predominately found in Zimbabwe and a few others in Mozambique, South Africa and Botswana (Fig. 1; Pikirayi, 2001; Macamo, 2005; Huffman, 2007; Kim & Kusimba, 2008; Pwiti *et al.,* 2013). Great Zimbabwe is the largest and most elaborate of these ancient structures, making it a unique expression of a built tradition in Africa and a challenging heritage to manage and conserve.

Once the capital of an Iron Age empire, Great Zimbabwe is an ancient complex of dry stone-built structures covering over 720 hectares. During its occupation and flourishment, the geographical and political influence of the Great Zimbabwe state was extensive, covering some parts of the contemporary countries of Botswana, Mozambique, South Africa, and Zimbabwe (Huffman, 2007; Kim & Kusimba,

2008; Chirikure, 2021). Many scholars concur that during the Iron Age, this site was the largest settlement and built-up area in sub-Saharan Africa before the colonisation of the region in the 17th century (Pikirayi, 2001; Pwiti *et al.*, 2013; Chirikure, 2021). The site is protected as a national monument since 1937 and a World Heritage Site since 1986. The most outstanding material remains are stone structures, built without mortar or any binding material, architecturally known as dry-stone masonry. The National Museums and Monuments of Zimbabwe (NMMZ), a government-aided department under the Ministry of Home Affairs and Cultural Heritage, administer Great Zimbabwe. Around the site, the communities of Nemanwa, Mugabe, Murinye and Charumbira live, maintaining ancestral connections to it (Ndoro, 2001; Fontein, 2006; Chirikure, 2021). Indigenous dry-stone masonry persists amongst the local communities and remains invaluable for conserving Great Zimbabwe and similar sites elsewhere in Zimbabwe, South Africa, Mozambique, and Botswana. These locally informed knowledge, skills and practices have never been recorded in detail.

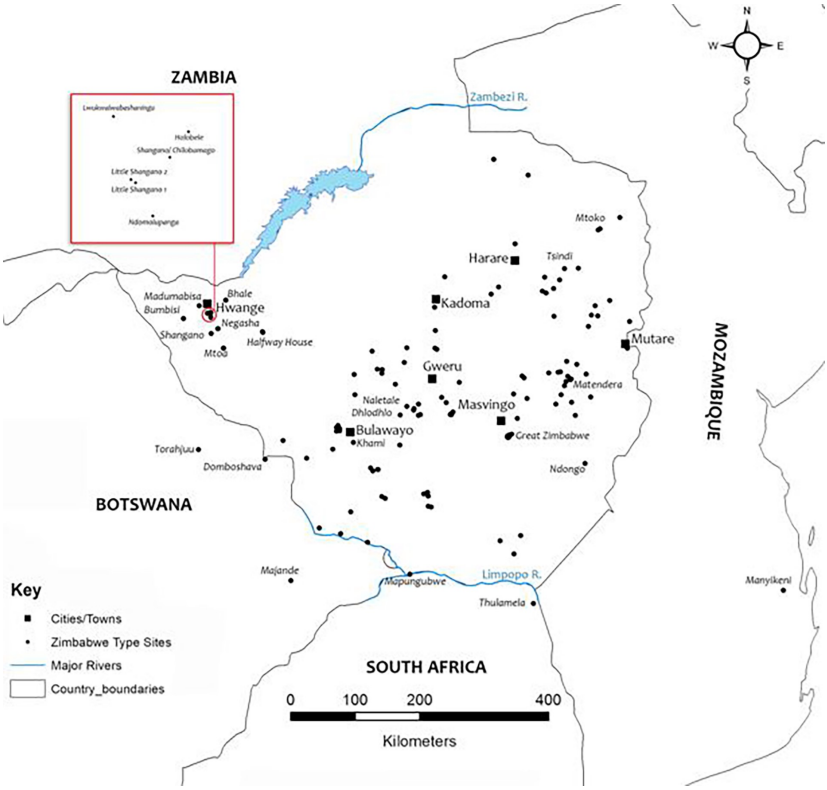

Fig. 1. Map showing the distribution of monumental stone buildings of the Zimbabwe culture in southern Africa

Beginning in March 2021, I embarked on a project that aimed at documenting and safeguarding the indigenous knowledge, skills and practices of dry-stone masonry associated with the conservation of Great Zimbabwe. The project pursued three main aims: 1) production of a census of dry-stone masons around Great Zimbabwe, mapping their activities in space and time, and participatory assessment of their lasting impact; 2) documenting

knowledge, traditions and practices of stone quarrying, identification of structural problems and dismantling of walls, and restoration, re-construction and monitoring of dry-stone-built walls; 3) construction of a digital archive designed as a repository resource for the conservation, transfer and dissemination of dry-stone masonry knowledge and practices. I deployed a combination of methodological approaches that included analysis of written sources, participatory observations, and focus group discussion. The project results form the basis for developing a digital archive of dry-stone masonry knowledge for the conservation of Great Zimbabwe and functioning as a repository resource for training and public engagement activities.

Restoration and Conservation of Great Zimbabwe

Great Zimbabwe consists largely of dry-stone walls and numerous *dhaka* (adobe) structures constructed on the steep-sided hill and spreading to the adjacent valley (Ndoro, 1995). Today, the monumental stone buildings are the major physical attraction and material heritage that fascinate people from diverse geographical, academic, and cultural backgrounds (Fig. 2). These stone walls were built from biotite granite blocks quarried from bedrock outcrops around the site (Dube, 1990; Rambanapasi, 2016). The dry-stone walls are either freestanding or retaining walls. They vary in height between 1 and 12m and have a width of 1-5m. Predominating Great Zimbabwe are freestanding walls.

This type of walling is constructed with two outer faces of regular, coursed blocks and core material consisting of less regular, stacked blocks and was used to create enclosures. The retaining walls, which are fairly few at Great Zimbabwe compared to other similar sites such as Khami, were built to form platforms, mainly on hill slopes.

Fig. 2. Dry-stone wall, Great Zimbabwe (Author)

Over the years, the dry-stone walls at Great Zimbabwe have been a subject of architectural, engineering, and archaeological studies (Masey, 1911; Schofield, 1928; Sassoon, 1982; Whitty, 1961; Walker & Dickens, 1992; Chipunza, 1994; Rambanapasi, 2016). Of note is the architectural study undertaken in the 1950s by Antony Whitty. Building on earlier observations by Schofield

(1928) and others at Great Zimbabwe, Whitty (1961) defined four architectural styles, namely, P (Poor), PQ (Poor/Quality), Q (Quality) and R (Rough) (Fig. 3). This classification translated into an evolutionary sequence of building and construction skills related to the development from the original poor walling in P style, a transition towards a better construction skill represented by a combination of P and Q and culminating in the perfection of walling with Q style (Shenjere-Nyabezi *et al.,* 2020). The R walling was thought to represent degeneration in building and construction skills and was associated with cultural decline. However, the indigenous knowledge, perceptions, skills, experiences, and views held by the dry-stone masons have not been documented and discussed within the evolving academic interest in restoring and conserving Great Zimbabwe (Ndoro, 1995; 2001; Pwiti, 1996; Rambanapasi, 2016). Previous research has concentrated on understanding the architectural, engineering, archaeological and other technical details of the dry-stone built walls (Walker & Dickens, 1992; Ndoro, 2001; Chikwanda, 2006; Mupira, 2011; Mukwende, 2011; Ndlovu, 2015). Very limited, if any, efforts have been made in researching the indigenous practical knowledge and skills of conserving the dry-stone walls. It is this gap in knowledge that this paper addresses by presenting and discussing the knowledge, skills and practices of dry-stone masonry in Great Zimbabwe.

Fig. 3. The walling styles as identified and defined by Antony Whitty (1961)

Ndoro (2001) and Chikwanda (2006) argued that the restoration and conservation work at Great Zimbabwe commenced with the original builders, who built, restored and maintained these structures. Evidence depicting repair and restoration work by the original builders has been recovered during restoration projects at Great Zimbabwe (Chikwanda, 2006). As such, the conservation history of Great Zimbabwe pre-dates the colonial era (1890-1980). However, the popular Western-centric assumption has been that the Europeans only introduced the conservation of built heritage in Africa in the early 19th century. Scholars such as Ndoro (2001) and Ichumbaki (2016) strongly assert that African communities had their regulatory frameworks and approaches to the conservation of built heritage sites. At Great Zimbabwe, the European philosophies and practices of conserving the site were introduced during the colonial era (1890 – 1980). In 1909, Frederick Masey, a surveyor, was commissioned by the colonial government to carry out a condition survey of the site (Masey, 1909; Ndoro, 2001; Matenga, 1996, 1997). He is credited by some writers such as Ndoro (2001), Chikwanda (2006) and Sagiya (2020) for producing one of the earliest conservation documents for Great Zimbabwe. Amongst several recommendations, Masey highlighted the need to

reconstruct collapsed walls and appoint a resident curator. Based on Masey's recommendations, St Claire Wallace was appointed curator in 1911, and he worked at the site up to 1948.

Wallace carried out large-scale restorations at the Hill Complex and the Great Enclosure. However, some of his interventions have been criticised and accused of being inappropriate, threatening the monument's authenticity (Ndoro, 2001; Chikwanda, 2006; Fontein, 2006). For example, the collapsed entrances to the Great Enclosure, which Wallace restored in the 1930s to open the doorway, were later, in the early 1990s, incontrovertibly proved to have been lintelled entrances (Matenga, 1996, 1997). After the retirement of Wallace in 1948, the conservation work at Great Zimbabwe experienced a period of moratorium, a phase of no serious repair of walls and other related conservation measures. During the peak of the liberation struggles for independence (1976 – 79), major and even minor conservation work at Great Zimbabwe practically ceased due to the security situation. From independence in 1980, a new conservation ethic was ushered. The new government of Zimbabwe engaged several consultants to study and recommend appropriate restoration and conservation approaches.

To date, restoration and repair of walls are amongst the major conservation work at Great Zimbabwe. However, the

voices and experiences of the local dry-stone masons are silent in the corpus conservation literature, even when their knowledge and contribution in the restoration of the site are invaluable. This knowledge gap is partly due to inadequate research and documentation of indigenous knowledge, skills and experiences of dry-stone masonry. Few studies have been conducted on this topic at Great Zimbabwe and other similar sites elsewhere. These include, for example, studies carried out in 1989 at Great Zimbabwe, which sought to establish ancient quarrying sites and techniques (Dube, 1990). However, these studies focused on experimental quarrying and presenting the results in academic forums. Other critical skills and knowledge on dry-stone masonries such as the processes of acquiring the knowledge and its transfer and the practical restoration of stonewalls, were not researched, and remain undocumented. In his annual report, Ken Mufuka, the first African director (1982 – 1983) at Great Zimbabwe wrote:

> The need for preserving the walls of the Great Zimbabwe was highlighted by the visit of a United Nations expert on preservation. While we await further action from the international organisation on this score, we have appointed a small team under the direction of Mr J Thokozane on a full-time basis. The late Mr. J Vengai Mugabe (Edward and Leonard's father), worked with Mr Wallace, the curator who first thought of preservation and rebuilding of the walls on a grand scale in 1930s. The name Vengai (Mugabe) has been associated with dry stone building at Great Zimbabwe for the last fifty years (NMMZ Annual Report 1982: 15).

Ashton Sinamai, a former curator at Great Zimbabwe, made similar observations to the ones expressed above. Sinamai (2019:106) observed that amongst the local communities settled around Great Zimbabwe, there is a crop of skilled local dry-stone masons, most of whom come from the Mugabe (Duma) clan. He further argued that people from other nearby clans have mastered dry-stone masonry through the training they received from members of the Mugabe clan. What is glaring is the fact that there is no documented succession planning to pass the dry-stone masonry knowledge and skills from generation to generation. There is no framework for sharing experience and professional development. Furthermore, Zimbabwe does not have a policy on the preservation of ancient craftsmanship, such as dry-stone masonry. Indeed, the knowledge and practice of dry-stone masonry is under threat not only at Great Zimbabwe, but also in the rest of the country.

The attempts by NNMZ and its partners to enhance and develop dry-stone masonry as a profession have not been successful for various reasons. In the mid-1990s, the NMMZ engaged some French consultants to work with the local dry-stone masons in carrying out major restoration work at Great Zimbabwe. This initiative was, however, condemned by the local communities as captured in a letter to the editor published in one of the national daily newspapers, *The Herald*, the Anonymous wrote:

> We are very concerned at the state of affairs at Great Zimbabwe. The decision by the government to engage the French to rebuild the ruins is stupid and ill-advised. They should have consulted the elders of the area but we were treated like outsiders. I understand that one wall which they built with cement collapsed showing the supernatural powers of the spirits […]. We must follow our tradition if we want to prevent the walls collapse [Signed 'Very Concerned', Letters to the Editor, The Herald, 24/06/1994, p. 6].

Although no cement was used at Great Zimbabwe, 'Very Concerned' was not far from the truth since at the similar site of Khami cement and metal reinforcements had been used by the conservators of European origins. Thus, this letter to the editor underscores that Westerners lacked the indigenous knowledge and skills to preserve the dry-stone architecture authentically. Again, between 2000–2013, the NMMZ collaborated with the Association Chantiers Histoire and Architecture Médiévales (Association CHAM). Association CHAM is a French-based non-governmental organisation whose objective is to protect historical buildings suffering from neglect and require intervention measures (Mukwende, 2011). The purpose of this partnership was to run an annual youth volunteer programme to restore the dry-stone structures at Khami World Heritage Site, the second largest dry-stone-built site in the country after Great Zimbabwe. Among other objectives, the Khami Restoration International Youth Camps were meant to capacitate and transfer dry-stone

masonry knowledge and skills to university students studying archaeology and related fields from southern African universities. The programme also included youths selected from the local communities where monumental stone buildings of the Zimbabwe culture exist (Mukwende, 2011; Chirikure *et al.,* 2015). Unfortunately, for reasons beyond the discussion of this paper, this initiative did not produce lasting knowledge and skills transfer of dry-stone masonry in the country. Cases such as these resonate with the ever-increasing ideas that the knowledge, skills and practices of restoring dry-stone walls at Great Zimbabwe should be appropriate to the cultural context to which the site belongs (Pwiti, 1996; Sagiya, 2020; Sinamai, 2020).

Furthermore, it is a fact that dry-stone-built walls are inherently prone to weakness and structural problems because of numerous factors, including some tourists who climb on walls, vegetation overgrowth and animal trampling. Largely due to the limited number of dry-stone masons, the restoration work of dry-stone structures has been confined to Great Zimbabwe at the expense of other similar sites dotted around the country. The physical damage of dry-stone structures can only be controlled and limited through continuous restoration and conservation. The conservation of dry-stone structures requires specific masonry knowledge and skills. However, due to natural deaths, retirement and lack of sustainable transfer or training, dry-stone masonry practices and knowledge

systems are now critically under threat. Henry Mugabe, one of the retired stonemasons interviewed in the context of the EMKP documentation project, said:

> Due to the limited number, this site will be poorly conserved, giving the false impression that stonemasons are not doing their duties and responsibilities properly. The poor conservation state of this site paints a bad image of our country. Currently, the stonemasons are few, but they used to be many. The work that eight people did is now being done by only four people (Field notes, 2021).

Owing to the NMMZ's failure to employ the required numbers of dry-stone masons due to limited government budgets and overstretched resources, it is likely that the masonry skills among locals will be redundant and untapped. More so, as a physically demanding practice with limited employment opportunities outside the heritage sector, dry-stone masonry as a profession has failed to attract the interest of the youths. The practice has also remained male-dominated. In southern Africa, particularly in Zimbabwe, there is a lack of grooming and institutionalisation of this profession. Besides the NMMZ, and the occasional whims of wealthy individuals, there is no demand for the skill in the building industry. There is no framework for sharing experience and professional development. The knowledge and practice of dry-stone masonry is under threat. Driven by such a situation, funding was sourced from the EMKP programme to

document and preserve dry-stone masonry knowledge, skills and practices for maintaining and restoring the stone-built walls at Great Zimbabwe.

Theoretical and Methodological Approaches

Two theories of the 'archaeologies of listening', and decoloniality were deployed as a conceptual framework in the recording, analysing and discussing dry-stone masonry knowledge, skills and practices at Great Zimbabwe. Listening is a skill, an art, and a means of gaining knowledge (Schmidt & Kehoe, 2019). Accepting the local people as thinkers and knowledgeable has yet to gain traction in archaeological and heritage management practices. Central to the Archaeologies of Listening is what the proponents of this concept called 'epistemic humility' (Schmidt & Kehoe 2019, p. 15). Epistemic humility is reflected by the readiness of the researcher to listen without privileging his/her academic and/or professional background. These ideas embedded in the Archaeologies of Listening made it a relevant theoretical framework for recording indigenous dry-stone masonry knowledge, skills and practices of conserving Great Zimbabwe.

The decolonial theory was useful and relevant for this study because Great Zimbabwe is an example of a past that was denied local connections and histories by the colonial establishment. Both armature and professional European researchers appropriated Great Zimbabwe's materiality for

cultural, political and racial motives (Ndoro, 2001; Fontein, 2006; Sinamai, 2020; Chirikure, 2021). Such Eurocentric handling of Great Zimbabwe perpetuated largely from the 1890s to the late 1970s, submerging knowledge not only about the site's history but also the locally informed skills and practices of conserving its material remains. In contexts such as this, decoloniality and Archaeologies of Listening become relevant and useful theories to inform the recording and discussion of the knowledge, skills, and practices of dry-stone masonry.

Methodologically, the data presented and discussed here was generated through qualitative research approaches. The main data collection tools were documentary analysis, in-depth interviews, participant observations, and focus group discussions. The documentary analysis included a detailed study of written, cartographic and imagery material concerning the recording, monitoring, and conservation of structures at Great Zimbabwe. For this purpose, the written and mapping material at the NMMZ archives (at Great Zimbabwe and the NMMZ's Head Office archive in Harare) were examined to establish the history of documenting and restoring dry-stone structures. At Great Zimbabwe, there is a Research and Conservation Centre built in the 1990 that was initially meant to be the research centre for the conservation of dry-stone monumental structures in Southern Africa. Due to lack of funding, government support, among other factors, this facility has

not operated as envisaged. Despite its failure to service the southern Africa region, Great Zimbabwe's Research and Conservation Centre houses a rich body of archival material, including photographs of dry-stone walls dating the early 1900s. Other documents include restoration reports of Great Zimbabwe and other similar sites, dry-stone wall site maps, and other records of previous conservation research projects. The documentary analysis also included the examination of published and unpublished (hand-written, typed, and electronic) documents including books, journal articles, restoration reports, memoranda, newspapers, and photographs. These documents provided insights into how the stonemasons' knowledge, practice, and skills have developed in recent decades but also remain marginalized in the ever-growing literature on the conservation of the Zimbabwe Culture sites. Synthesising these data was beneficial towards guiding questions during interviews and discussions, and for identifying specific attributes to be observed and recorded during participant observation activities.

The participatory observations were focused on documenting in detail the knowledge and practice of stone quarrying, monitoring and conservation of structures, and criteria for assessing and recording their conditions. These observations were meant to gain practical insights on procedures, processes and decision-making relating to the restoration and conservation of dry-stone walls.

Observations were recorded in field notebooks. Interview questions directed to the stone masons were derived from participatory observations. The interviews engaged the local stone masons, their assistants and other dry-stone wall conservators such as curators and monument surveyors employed by NMMZ, some on retirement. In the context of the project, the interviews entailed talking interactively with dry-stone masonry knowledge holders and practitioners, asking them questions, listening to them, and accessing their accounts. In comparison with other qualitative research methods, interviewing had the advantage of in-depth learning and understanding of different facets of dry-stone masonry as critical craftsmanship in the conservation of Great Zimbabwe. The interviews focused on documenting information:1) how and when a person became a stonemason; 2) where and how stones are quarried for restoration purposes; 3) criteria for identifying structural stress on walls; 4) practices of restoring a collapsed or progressively collapsing wall and 5) perceptions of, and aspirations on the future of dry-stone masonry in Zimbabwe.

Subject to consent, the interviews were audio-visually recorded for full transcription on digital formats, which were read repeatedly and juxtaposed against the data generated from participant observation and group discussion activities. Throughout the project, I participated in minor and major restoration projects held at Great

Zimbabwe and other similar sites between March 2021 and October 2022. The critical practices of restoring dry stone-built walls were recorded in detail through note-taking, photography and video recordings.

One focus group discussion with dry-stone masons, local community elders, heritage managers, conservators and academics was held towards the end of fieldwork activities. This discussion was meant to collect the multiple understandings, views, and perceptions of different actors towards the restoration of Great Zimbabwe's dry stone-built walls. The focus group discussion was critical in widening the understanding of the topic. This was achieved by involving members of the local communities not directly involved in dry-stone masonry in dialogue with dry-stone masons, curators, and academics. The views and perspectives emerging from such a diversified focus group discussion were vital in understanding the current status quo of dry-stone masonry and proffered ways in which this endangered trade can be safeguarded and developed. The datasets generated through these above-presented methods within the conceptual lens of the Archaeologies of Listening were sorted, coded and edited in accordance with the project's objectives.

Fieldwork Results

The project's thrust has been to digitally record locally informed knowledge, skills and practices of dry-stone

masonry at Great Zimbabwe to preserve the craftsmanship rapidly disappearing in Zimbabwe. The recorded knowledge, skills and practices were sorted and organised in different digital formats such as audio-visual, audio, textual, and photographic. The different digital formats include recordings capturing the indigenous transfer of skills and knowledge in dry-stone masonry and various skills and practices on monitoring and restoring dry-stone walls. The quantity and scope of the recorded digital assets are summarised in Table 1.

Table. Documented digital assets dry-stone masonry cultures

Type	Duration in h/Amount	Size in GB	Composition
Audio-visual	10h 24min	80.8 GB	Recordings capturing the following processes at Great Zimbabwe and its surroundings: stone quarrying, selection and dressing of stone blocks, foundation preparation, restoration, and repair of dry stone-built walls. The audio-visual assets include part of the interviews with dry-stone masons, curators/conservators, community elders and heritage managers.
Audio	9h 20min	8.26 GB	Interviews with dry-stone

Type	Duration in h/Amount	Size in GB	Composition
			stonemasons and dry-stone architecture conservators, and; Focus Group Discussions.
Textual	54 pdf documents	0.26 GB	Signed consents for research participants, interview and Focus Group Discussion transcripts, and manuscript of academic articles
Photo	ca.300 photographs	27.2 GB	Photos largely capturing dry-stone masons performing the following activities: stone quarrying, selection and dressing of stone blocks, foundation preparation, restoration and repair of dry stone-built walls. The photos also include those of the different wall sections, research participants and other community engagement activities of the project.
Annotation		<1GB	Documents of interview transcripts and translations as well as commentary on the recorded stone masonry practices.

One of the research objectives was to record the acquisition of stone masonry knowledge and skills. Amongst the interviews with stone masons, the hands-on learning and mastering of dry-stone masonry were echoed in detail during an interview with Leonard Vengai Mugabe, one of the retired and respected stonemasons who worked at Great Zimbabwe and related from 1974 to 2008. He said:

> I trace my involvement in dry-stone masonry as far back as 1974. This is when I was now a skilled and experienced mason after being trained by my father. However, by then, I was not being paid in monetary terms. I was being paid in the form of 'large' bottles of sweets by Mrs Lilian Hodges [Curator at Great Zimbabwe in the 1970s]. Every month end my father and his workmates would receive their salaries. So, it was a way of making me like working with my father in restoring dry stonewalls. This is how I became a stone mason (Field Notes, 2021).

The current crop of stone masons at Great Zimbabwe was trained either by Leonard or by a stone mason whom he had trained. The focus of training is largely on the technique of packing the core stones of the wall. In the absence of mortar, what sustains dry-stone-built structures are mainly the core stones and the application of the principle of gravity and friction. According to Leonard, a dry-stone wall cannot be restored by someone who does not know how to pack core. Leonard is from the Mugabe clan, one of the local communities historically connected to the site. His father, Vengai, who died in 1977, was a stone

mason during the colonial era (1890 – 1980). In 1982, Ken Mufuka, the first 'black' director at Great Zimbabwe, reported that:

> The preservation of the walls of Great Zimbabwe was highlighted by the visit of a United Nations expert on preservation. While we await further action from the international organisation on this score, we have appointed a small team of the Vengai (also known as Mugabe) brothers, Edward and Leonard to work under the direction of […] on a fulltime basis. The late Mr Vengai Mugabe (Edward and Leonard's father), worked with Mr Wallace, the curator who first thought of preservation and rebuilding the walls on a grand scale in 1930. The name Mugabe has been associated with dry-stone building at Great Zimbabwe for the last fifty years (NMMZ Annual Report 1982, p. 23).

Based on the interview with Leonard, when he and his father were working under the curatorship of non-African heritage managers, they were allowed to intervene in structural problems using their local knowledge and skills. Leonard emphasised that during the colonial era, stone masons were regarded as experts when it came to the restoration of dry-stone walls. Leonard's younger brother, Henry Mugabe, had been the head of the stonemason at Great Zimbabwe until June 2019 when he retired. Daniel Mugabe (from the same clan) is one of Great Zimbabwe's most experienced stonemasons. This trend is suggestive of the hereditary nature of dry-stone masonry at Great Zimbabwe. With this observation, Leonard believes that

dry-stone masonry is not a skill that one can acquire solely through formal education and training. He argues that underlining the profession is the passion and determination of the trainee. During an interview, Leonard pointed out that:

> You might be able to send people to training colleges, but in my view, this craftsmanship does not need education or schooling. It should be like that person who is possessed and empowered by ancestral spirits. This profession requires determination and passion, which cannot be obtained from the school. It is a profession that even if one is trained and the person has limited passion, they will not pursue further. However, if one is determined and passionate, the person will go far (Field notes, 2022).

The hereditary nature of dry-stone masonry as a profession is contested. Fewer of the curators and heritage conservators who participated in this study were of the view that the knowledge and skills of dry-stone masonry can be formally transferred through vocational or even university training. Edward Matenga, a former curator and director at Great Zimbabwe provided his opinion saying:

> I think the biggest problem with using the term 'indigenous knowledge systems' is that we want to live it to nature so that it must grow, must have its natural trajectory. Nevertheless, all civilisations survived because they plan, preserve, and accumulate knowledge, which is recorded, and they continue to revive it. So, instead of leaving it to nature, the best thing is to formalise it and continue to develop it so that it becomes a pool of

> knowledge that can be used in the future. If you leave it with the dry-stone masons and say that his grandson is going to rise in the future and start the profession again, it is not a smart way of keeping knowledge and passing it on to the next generations. This happens by chance, but what is the chance that Leonard's grandson is going to wake up and become a stonemason? Why not another child using that pool of knowledge? This is the danger of this concept of indigenous knowledge system that it is allowed to find its natural passage, natural trajectory (Field notes, 2021).

In contrast to the views expressed by Matenga, other curators interviewed in this study are of the opinion that knowledge transfer and training cannot be exclusively achieved through formal institutions and practices. Relying on decolonial theoretical lenses and praxis, dry stone masonry knowledge, skills and practices are best transferred through the informal means. As such, two dimensions of transfer of knowledge and skills in dry-stone masonry have emerged in this study. One is rooted and inspired by indigenous methods of passing knowledge and skills orally and through active participation. The second is through formalisation of processes in the transfer of skills through vocational training and other related Western-modelled educational systems. These two views can be reconciled as a way of forging a sustainable future for dry-stone masonry at Great Zimbabwe. Ngulube (2002: 95) observed that the success of humankind is going to largely depend on gathering, analysing, storing, sharing, and

harnessing what other members of society know, as well as drawing upon codified and documented knowledge. Given such ideas, the focus of preserving dry-stone masonry knowledge, skills and practices should be centred on sharing what stone masons know and experienced in the restoration and conservation of Great Zimbabwe and other similar sites within the region.

In dry-stone masonry, the stone is the major construction material. Knowledge, skills and practices of stone quarrying is a prerequisite for stone masons in the restoration and conservation of Great Zimbabwe. The ancient builders of the site quarried stones from the surrounding granite outcrops. On this aspect, the limited research undertaken so far has resulted in the identification and documentation of ancient quarry sites within and beyond the 720ha Great Zimbabwe estate (Dube, 1990; Rambanapasi, 2016). For this study, in-depth interviews with stone masons and demonstrations of the quarrying techniques were audio-visually recorded as part of the fieldwork. What emerged from the collected data is that not every granite outcrop is suitable for quarrying. A case in point here is a type of granite rock, referred to by stone masons as *'imbwegadzi'*, a Shona word that means a feminine type of a rock. Stone masons know that stone blocks from such a rock are not suitable for use in repairing dry-stone walls for it is weak and succumbs to excessive weight and other related pressures. Furthermore, one must know about identifying

suitable quarry sites that could yield the required stone blocks. Leonard, the veteran stone mason, explains this by saying:

> When carrying out quarrying, we look for a granite mountain or hill and identify sections with cracks. We assess the thickness. We cut firewood and line it, following the size of the desired stone blocks. We then light up the fire. The heat then breaks the stones up to the last point of the fire. We then use a hammer slightly, and the granite stone breaks into different sizes (Field notes, 2021).

The percussion-splitting and fire-setting quarrying technology explained above has also been associated with the original builders of the site (Schofield, 1928; Dube, 1990; Rambanapasi, 2016). Thus, fire-setting was central to the quarrying technique in the past, as it is today. After quarrying, stone blocks are broken into the required thicknesses and sizes before being transported to the construction site. Stone blocks are further sorted and separated at the construction site into face and core blocks. The face blocks are the regular ones ideal for façade construction, and the cores are the irregular ones that are systematically packed, bonding them with the outer courses.

In addition to their knowledge of stone quarrying, stonemasons possess skills in monitoring the dry-stone built walls. Monitoring is critical in the conservation of built

heritage, such as Great Zimbabwe. A structural monitoring scheme was introduced at the site in 1986 to identify and quantify areas within the dry-stone walls threatened with collapse. Since that period, Great Zimbabwe has been a 'laboratory' of wall monitoring experiments. A wide array of methods and equipment have been employed, including demountable demic strain gauges, triangulation surveying, and glass wires to detect in-plane movement (Ndoro, 1995, 2001). In 2019, experts from Italy were engaged to enhance the monitoring system of dry-stone walls. As a result, a real-time automated wall monitoring system has been installed on an experimental basis to operate alongside the regular and general eye dry-stone walls monitoring. The stonemasons have manually undertaken this task using their indigenous knowledge, skills and practices. The following interview with Mr Leonard Mugabe captures the depth of such locally informed monitoring methods:

> **Leonard Vengai Mugabe**: Yes, there are many things that I learnt and observed from my father. My father used to assess a wall that shows structural problems closely. He would look for soil coming out of a wall. He would also put his ears on a wall, listening to the sounds and movement of small stone particles inside. After listening to these sounds with his ears, he used to go and report the concerned wall to Mrs Hodges, suggesting the need to dismantle and restore it. Later, I realised he used to listen to small stones that break inside a wall. These small stones will be producing some sounds like *chik-chik, chik*. I also learnt through this approach to identify walls that are about to collapse. With time, as well as

> when there was an increase of knowledge on wall monitoring, we started to witness new methods. We started using the demic strain gauge to monitor wall movements.
>
> **Interviewer**: You mentioned earlier that your father used to monitor the dry-stone walls at Great Zimbabwe by putting his ears on problematic walls, listening to the sounds within the wall. I want to know the methods you were using as the lead stonemason before archaeologists such as David Collett arrived. Were you using the same methods that you had observed and learnt from your father or were you using other means?
>
> **Leonard Vengai Mugabe**: We were not using a specific method. However, during that time, I inspected every wall in the Hill Complex, Valley Enclosures and the Great Enclosure early in the morning. I would check if there is a wall that had collapsed or developed a structural problem. I was not using any machine or gadget to monitor the wall movement besides my knowledge and experiences, some of which I had learnt from my father. For example, my father would listen to a wall that would have developed a bulge or shown signs of structural problems. Later, we started using other methods, such as colour coding. (Field notes, 2022).

Ironically, the above-cited indigenous wall monitoring techniques have not received scholarly attention, let alone been formalised in the conservation of Great Zimbabwe. Instead, the site conservators continue to experiment with 'Western' science in real-time automated wall monitoring

systems and many other methods that have been tried and failed since the 1980s. As such, notable epistemological differences in monitoring wall movement are embedded in different ontological standpoints. The Western approach subscribes to objective methods, while the indigenous approach uses subjective methods. The current research does not discredit the use of 'Western science' but draws attention to other local ways of knowing and doing that can be harnessed for the sustainable conservation of Great Zimbabwe.

The stone-built walls at Great Zimbabwe have no mortar or binding material. This makes them temperamental, characteristically unstable structures which require constant monitoring, repair and restoration. In this regard, the stonemasons have mastered the art of intervention. Based on their documented knowledge, one needs to examine the foundation of a wall prior to any restoration work. Cementing on this point, Mr Henry Mugabe reiterates:

> When restoring a dry-stone built wall, one should pay particular attention to the foundation. It does not matter the foundation type, whether on soil or rock surface. What I observed was that it is not every type of clay soil was used for foundations. There are specific areas where they would get the suitable clay. I also suspect that they would use a suitable loose granite stone; they would grind it into heaps and then mix it with clay from anthills, sprinkling it with some water to make it ready for use. This is what I suspect to be one of the methods that were used by the original builders of these dry-

> stone-built walls that we are now restoring and conserving (Field notes, 2021).

In conservation work such as monitoring and restoration, the stonemasons attach spiritual and cultural values to the stone walls. Some of the stonemasons who participated in this study considered masonry risk-prone craftsmanship that can result in disabilities. One can fall from a scaffold or get struck by a stone block, resulting in injuries or even death during the restoration process. As such, practising stonemasonry at a sacred site such as Great Zimbabwe requires spiritual guidance and protection from the ancestors. Munyaradzi Mapfuwa, a stonemason at the site, and Samuel Rufuharuzivishe Mugabe emphasise this issue by urging:

> It is important to respect the ancestors to avoid problems. This is because we did not build these structures. These structures were built long ago, and our task is to restore what would have collapsed. Therefore, we should respect the tradition and culture whenever we are restoring and conserving such places (Field notes, 2021). Even the elders from the local communities also believe that the ancestors are pleased when they are appeased through a ritual or ceremony prior to any major restoration work (Field notes, 2021).

The local communities are not against the physical intervention of stonewalls. Instead, their wish is for the process to recognise and respect the spiritual and other cultural beliefs associated with Great Zimbabwe (Pwiti,

1996; Ndoro, 2001; Fontein, 2006). Thus, over the years, the dead, retired, and current serving stone masons and local communities have accumulated a wealth of knowledge and skills of dry-stone masonry that are critical in the conservation and management of Great Zimbabwe. For instance, through their locally informed knowledge, the stonemasons understand the behaviour of walls over different seasons. They can monitor and restore collapsed or unstable walls. As endangered craftsmanship in Zimbabwe, there is a need for dialogue among stakeholders and interest groups like stonemasons, local communities, educational institutions, academics, policymakers, and private and governmental organisations.

Discussion

Dry-stone masonry is a widely spread ancient craftsmanship with traces in Europe, Australia, Africa and North America. Like other craftsmanship deeply rooted in indigenous worldviews, the knowledge and practices of dry-stone masonry is under threat and disappearing. Modernity has ushered in new construction materials and techniques that have transformed building traditions. Thus, there is a need to safeguard the art of dry-stone masonry worldwide. European countries like Croatia, France and the UK have introduced and promoted programmes and associations to preserve dry-stone masonry knowledge and practices. In the UK, numerous groups, local and national provide training and information about dry-stone masonry.

The popular one is the Dry-Stone Walling Association – DSWA (Post, 2005) formed in 1968. One of the objectives of the DSWA is "to ensure the best craftsmanship of the past is preserved and that the craft (of dry-stone walling) has a thriving future" (Post, 2005 p.13). In France, dry-stone masonry has been revitalized through the introduction of certification and the official registration of the skill at national level. Furthermore, Croatia, Cyprus, France, Greece, Italy, Slovenia, Spain and Switzerland nominated for inscription the art of dry-stone walling, knowledge and techniques on the Representative List of the Intangible Cultural Heritage of Humanity and it was inscribed in 2018 (UNESCO 2018). Whilst there are several strategies for preserving dry-stone masonry knowledge and practices in some European countries, very limited efforts are being made in Africa, particularly in Zimbabwe and other southern African countries where this tradition is prominent.

In southern Africa, there are very few experienced and skilled stonemasons. Of the few, most if not all, are employed by the NMMZ and stationed at Great Zimbabwe. Currently, there are just four who are employed on permanent basis. Some of the experienced stonemasons have died and a few are now retired. Often, for major and complex restoration projects of the monumental stone buildings of the Zimbabwe culture, countries such as Botswana and South Africa rely on stonemasons from Great

Zimbabwe. On one hand, in the academic conservation literature and discourses on Great Zimbabwe, and other similar sites, there is a glaring gap in dry-stone masonry. On the other hand, there is an absence of sustainable ways of passing on dry-stone masonry knowledge and skills to the present and future generations. The research presented here is a pioneering work towards documenting and managing knowledge on dry-stone masonry practices in southern Africa. Through the documentation of dry-stone masonry knowledge and practices from the practitioners, local communities and conservators, this project has generated invaluable information to inform policymakers, researchers, training institutions, and other stakeholders on dry-stone walling in southern Africa. The knowledge and digital materials generated through this project will serve as both a repository and a resource for the conservation, transmission, and dissemination of dry-stone masonry. This will enable practitioners, researchers, and institutions to access information and share methods, knowledge and strategies for preserving dry-stone masonry.

The dry-stone masonry at Great Zimbabwe is embedded in indigenous knowledge systems. Knowledge and practice have been passed from generation to generation through locally informed apprentice practices. The lack of knowledge of dry-stone masonry in the conservation academic literature on Great Zimbabwe is reflective of the politics of knowledge. There has been limited research on

conservation knowledge practices informed by local epistemologies. Western epistemologies and ontologies have dominated heritage conservation theories and practice in Zimbabwe for a very long time. Using the lens of the Archaeologies of Listening, the research tapped deep into the African ways of knowing to explore the knowledge, skills and practices of restoring dry-stone walled structures at Great Zimbabwe, one of the sites with evidence of early African civilisation and urbanisation. This study has revealed that there are indigenous methods of monitoring walls that are sustainable and effective. Such knowledge and practices need further research and enhancement to improve the conservation of dry-stone-built archaeological.

One of the ways that could enhance the conservation of Great Zimbabwe through locally informed dry-stone masonry knowledge and practices is the establishment of formal training centres. Currently, there is a lack of institutions that offer certification in dry-stone masonry in the whole region. Great Zimbabwe can be an ideal place to establish a dry-stone masonry-training centre. The landscape is rich in granite outcrops (construction material), including experienced and skilled stonemasons and a place of inspiration for this craftsmanship. Already, a Research and Conservation Centre was established at Great Zimbabwe in the early 1990s. The purpose of the centre was to conduct studies and experiments on the conservation of dry-stone walls whose results were to be applied in

conserving Great Zimbabwe and other similar sites in southern Africa (Sassoon, 1982). Due to lack of funding and an exodus of experienced experts to greener pastures, the centre has failed to operate along the main objectives of its establishment. Therefore, turning part of these existing facilities into a dry-stone masonry training and research centre can be one option for preserving this craftsmanship. Stonemasons' practical and theoretical training is critical because one of the dearth of documented and codified theoretical frameworks. Commenting on this issue, one of the curators had the following to say:

> When working with some of the stonemasons, I have noticed that they understand how to restore walls but do not understand the theory. When you are undertaking conservation work, you start with a theoretical framework. You want to ensure the masons understand and can practice what has been prepared as a theoretical framework. This might be caused by the fact that there is a flight in skills in the country, so the masons are now working without a theoretical framework. (Field Notes, 2021).

Vocational training centres and other related institutions can bridge the gap between dry-stone masonry practice and theory in the context of national and global conservation protocols and principles. For the success of this proposal, there is a need to unlock employment opportunities in the trade. Dry-stone masonry employment opportunities outside the cultural heritage conservation sector have not been recorded and exploited. There is, however, the

potential for harnessing dry-stone masonry in the modern building industries. Great Zimbabwe has inspired a few members from the local communities who have created self-employment by constructing lodges, perimeter walls and other structures mimicking the site's architecture. Such commercial stone masonry has diverted from dry-stone masonry using binding materials, but some of the techniques, such as quarrying, remain the same. Initiatives such as this, can be developed and enhanced through practitioners' engagement with different state and non-state stakeholders.

The commercial stone masonry mentioned above has great potential to stimulate heritage entrepreneurship (Pikirayi, 2006). Generally, heritage entrepreneurship focuses on preserving and promoting cultural heritage while identifying economic opportunities to create economic values (Zaman, 2015). Recently, two state universities in Zimbabwe, the Bindura University of Science Education and Great Zimbabwe University have introduced a dry-stone architecture module in their archaeology and heritage management degree programmes. Whilst this is a welcome development; universities can do more to unlock the economic value of the dry-stone masonry profession and heritage. For example, through the Innovation Hubs introduced at every state university in the country, departments can innovate around dry-stone masonry to make it a brand of architecture that can travel beyond the

restoration needs of monumental ancient buildings of the Zimbabwe culture. The business potential for dry stone masonry is evident in some modern buildings and resorts with architectural designs and styles inspired by Great Zimbabwe. For instance, in 2019, the United States of America's Embassy in Harare officially opened one of the largest embassies in Africa and beyond. The design and construction of this embassy were inspired by the dry-stone architecture used in the construction of Great Zimbabwe. This is just one example of many modern public buildings being designed and built in Zimbabwe, mimicking the ancient dry-stone architecture. Thus, dry stone masonry demonstrates the power of the past in the present and the potential value of the cultural heritage that needs to be tapped to benefit practitioners and host societies (Pikirayi, 2006).

Conclusion

The past and present research on Great Zimbabwe and other similar archaeological sites have privileged 'western' or 'scientific' knowledgies and conservation approaches, often ignoring the local expertise and practices (Pwiti, 1996; Sagiya, 2020). The current paper has shown that conservators, heritage managers, researchers and institutions who are part of the stewards of dry-stone walled monuments in southern Africa have so much to gain from listening to practitioners of this craftsmanship. Dry-stone masons must not only be regarded as 'labourers' but

as intellectual partners in the conservation of Great Zimbabwe and other similar monuments dotted around the country and the neighbouring countries of South Africa, Mozambique and Botswana. At Great Zimbabwe, dry-stone masonry has not yet received the same status afforded to the Western conservation knowledge bearers. Some conservators have questioned the extent to which indigenous knowledge, skills and practices should be permitted to exert authority over scientific conservation practices (Matenga, 2021; pers.com). This paper advocates for further research on the contribution of indigenous knowledge in the conservation of the monumental stone buildings of the Zimbabwe culture. Through retirement, death and other unforeseen consequences, southern Africa continues to lose skilled and knowledgeable dry-stone masonry practitioners. Without regional, national and even local skills transfer and developmental infrastructures, there is a danger that the knowledge and skills critical in the restoration and conservation of dry-stone-built archaeological sites may quickly disappear. This study was confined to Great Zimbabwe, but there is a need to extend to other similar sites in southern Africa where this type of heritage exists. A regional perspective on dry-stone masonry is long overdue.

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