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# **A CONSERVATION MODEL FOR ROCK ART IN SOUTH AFRICA:** A MANAGEMENT PERSPECTIVE

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A thesis submitted to the Faculty of Science, University of the Witwatersrand, Johannesburg, South Africa in fulfilment of the requirements for the degree of Master of Science.

October 2015

## Declaration

I declare that this is my own unaided work. It is submitted for the degree of Master of Science in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any other degree or examination in any other University.



.....

Signature of the Candidate

This 31ST day of October 2015

# Dedication

I dedicate this thesis to my late father **Mr. Boy Austin Katsetse** (1952−2013) whose teachings and winning spirit keeps me positive in life. We started this academic journey together and it made you proud to see me do well and you were keen on and looking forward to seeing me doing doctoral studies. Where ever you are, I know you are smiling down on me as I have taken a huge step toward doctoral studies by completing this Thesis.

"*You were born a child of light's wonderful secret— you return to the beauty you have always been."* (Aberjhani)

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To the Lord Heavenly Father who has given me the strength and courage to come thus further, I am thankful for the grace and blessing.

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## Abstract

A call for a more systematic approach to site protection and management has long been made for rock art conservation in South Africa. This study heeds the call as it aims to develop a conservation model for rock art in South Africa from a management perspective. Site protection and management principles that have been successfully implemented in Australia and America have seldom been implemented in South Africa. Conservation researchers argue that it is relatively easy to identify theoretically the requirements of a management or conservation policy; however, developing a conservation model and policy that will successfully maximize the conservation opportunities is an abstract task. As such building a conservation model founded on abstract concepts on conservation would not lead to an improved conservation practice and would be unsuccessful. In world heritage systems there are, however, essential agreed upon principles on assessment, criteria, guidelines, standards, and implementation.

Such systems therefore, underscore that the problem is perhaps not with theory but with conservation practice in South Africa. This study presents new and original research on rock art conservation interventions assessment on rock art. As a point of departure this study investigated the history of conservation practice in South Africa using a conservation assessment model developed by Kathleen Dardes (1998) for museums in America. The history on conservation practice has identified inconsistencies in the management of conservation treatments and approaches to interventions. Conservation interventions are still based on inductive, emergency salvage approaches with no thorough understanding of either site or environmental conditions in South Africa. There is little attention paid to indigenous sensitivities with conservation practices and there are no standard systems of monitoring and reporting. While far more data is required to provide definitive conservation strategies, this study proposes a three step conservation model for rock art in South Africa from a management perspective. This model focuses on initiating, planning and controlling conservation projects.

# Chapter 1: INTRODUCTION

Rock art research in southern Africa has strongly focused on the recording, interpretation and archaeological value of rock art with a great deal of success (Meiklejohn 1994).Little is been done to understand the mechanisms of deterioration of rock art until recently (see Meiklejohn 1994; Hoerlé & Salomon 2004; Hoerlé 2005, 2006; Hall *et al.* 2007a, b; Arocena *et al.* 2008; Huneau *et al.* 2008; Meiklejohn *et al.* 2009; Hall *et al.* 2010; Venter 2011). However, there has been not sufficient investment towards developing preservation techniques to ameliorate rock art decay. However, a handful of recommendations on how to improve rock art conservation and management in South Africa were put forward for implementation beginning in the late 1970s (Mazel 1982, 1983, 1984, 2012; Loubser 1991; Deacon 1994, 1996, 2006a, b, 2007; Wahl *et al.* 1998). It has been suggested that in order to improve rock art conservation and management in South Africa we should look elsewhere (Australia and America) to see what has been done and how as well to explore the possible implementation of such strategies locally (Loubser 1991; Deacon 1994).

Hitherto such calls for systematic management including a national database on rock art have not been fully heeded. Rock art researchers in South Africa appreciate that conservation and management approaches successfully implemented in Australia and America have been least put into practice locally (Loubser 1991; Deacon 1994).Therefore, rock art conservation management in South Africa has been characterised by missed opportunities to implement working approaches at a particular time in history. This failure to implement management and conservation principles can be attributed either to the poor administration of heritage, the lack of individual and institutional expertise and capacity, and/or the apparent lack of interest in rock art conservation (Mazel 1982, 2012; Deacon 2006a, Ndlovu 2014b). Within a framework of internationally recognised and appropriately applied

standards, heritage management is usually the responsibility of a particular community or custodian group (Deacon 2007). The responsible stewards of rock art in South Africa have failed to ensure compliance and implementation of site protection and management principles; failure resulted in bad rock art conservation management practice.

## 1.1. Statement of the problem

Rock art conservation globally was once based on the exploitative model that solely focused on the preservation of cultural heritage resources (Lipe 1974). This model was founded on the principles of an inductive piecemeal salvage approach. However, in the late 1960s conservation theory and practice began to take on new meaning in both archaeology and the conservation sciences (Stipe 1988; Demas & Agnew 2006). Site protection and management principles show a global shift toward the value-based approach (Lipe 1974, 1984; Loubser 2001; Demas & Agnew 2006). The conservation approach is founded on principles of the value based approach. These elements underscore the following steps for site protection and management (Loubser 2001: 105; Demas & Agnew 2006: 71):

- Preparation and background knowledge of the site
- Assessment of values and significance
- Assessment of the physical conditions of the site and causes of deterioration
- Assessment of the context in which the site will be managed, used and protected
- Review of alternative treatment options and testing of preferred options
- Actual intervention

The inefficient management of rock art is mainly due to the fact that conservation practice in South Africa has not moved beyond the inductive piecemeal salvage approach. Rock art conservation management under the inductive approach is unsystematic, irresponsible and ill-considered. This approach draws attention two practical issues in rock art management. Firstly, rock paintings are in peril and building research assists in the preservation of rock art (Webb 1980; Van Rijssen

1987; Dandridge 2000). Under the value-based approach the first action towards conservation is to gather background knowledge of the site which includes the assessment of value, significance, the physical condition of the site and causes of decay (Philippot 1988; Loubser 2001; Demas & Agnew 2006). However, when physical interventions are required, the conservation protocol is often not or rarely followed (Marshall & Tacon 2014). To promote standards of good practice in South Africa, we therefore, need to gather as much data pertaining to conservation treatments in order to avoid irresponsible and ill-considered treatment(s) that may accelerate the deterioration of rock art (Webb 1980; Van Rijssen 1987; Dandridge 2000).

In South African rock art studies there is a paucity of data on the conservation status of sites and paintings (Meiklejohn 1994; Venter 2011). Assessing the effectiveness of past interventions can enable the formulation of a library of conservation treatments, methods, and chemicals that are effective and those that are harmful (Dandridge 2000). Secondly, a conservation project should be based on historic knowledge about the site (Jopela 2010; Lage & Lage 2014). Therefore, conservation interventions should not be undertaken without knowledge of previous conservation work and the problems it revealed (Lage & Lage 2014).This will help create a site profile and inventory of the criteria used, significance of the site, baseline documentation, and establish site conditions. Conservation forms are an integral part of good management of rock art (Wahl *et al.* 1998). Thus, a rock art database is an essential part of the conservation cycle which allows going forward and backward, thus preserving by record (Janik 2014). Otherwise efforts of academic archaeology will be in vain if research is not directed towards preservation of the subject matter (Deacon 1999).

## 1.2. The Project

This project is inspired by experiences and practical challenges I encountered whilst conducting my Honours research. The project attempted to identify factors

causing deterioration and thereafter develop mitigation strategies for an engraving site in the North West Province, South Africa. I realised that South Africa suffers inadequate technical expertise as well as theoretical and practical examples of success in terms of conservation interventions. Furthermore, there are no monitoring programs to evaluate conservation interventions (Clark 2001; Fordred 2011; Venter 2011). This begs the question of what criteria are used to grant permission for interventions in the absence of a conservation repertoire that not only details successful interventions but also indicates which techniques have had negative impacts on rock art.

A range of conservation methods have been applied, from geotextile, hardening of exposed surfaces, roofing methods, and drainage options of sites on slopes, boardwalks, and floor paving (Wahl *et al*. 1998; Deacon 2006a; Matero n.d.). Conservation is a management strategy to ameliorate decay (Haskovec 1991; Dandridge 2000; Macleod 2000; Loubser 2001; Mawere *et al*. 2012; Darvill & Fernandes 2014; Lage & Lage 2014). Conservation and preservation differ broadly in theory, methodology and techniques (Lage & Lage 2014), and are infused with technical, theoretical, and methodological challenges (Haskovec 1991; Dandridge 2000; Macleod 2000; Loubser 2001; Mawere *et al.* 2012). Site managers have not adequately addressed conservation. Archaeological conservation is a discourse characterised by debates and conflict in theory and practice. Debates about definitions, meanings, standards, approaches, techniques, methodologies, and conservation ethics define the history of the discipline. The conservation of non-renewable cultural resources is an element of Cultural Resource Management (CRM), a term coined in America during the early 1970s (Fowler *et al.* 2009; Alonso & Meurs 2012). In this study the terms Conservation and Preservation are defined as follows:

‘**Conservation**’is:

*a technical study of materials making the rock art (pigments, rock substrate, environmental) elements aimed at ameliorating decay through the use of direct intervention measures;*

And,**'Preservation'** is:

*indirect measures broadly aimed at managing the destruction of heritage resources that results from anthropogenic activities through protective legislation, planning, education, the creation of positive attitudes and programmes that provide management contexts (people, place, significance).*

Rock art management broadly employs the following strategies to ameliorate decay (Carter & Grimwade 1997: 45):

- *In situ* protection/preservation, including total protection and zero use;
- Relocating of the elements to a new setting;
- Making the item or site available only to the appreciative and knowledgeable; and
- Complete access or use, subject to the management constraints including technological interference or enhancement.

These strategies highlight international standards and frameworks appropriate for site protection and management. However, the efficacy and successful implementation of these strategies are a function of heritage management that is shaped by the "administrative and legislative framework of the country in which they operate" (Cleere 1984: 125). Consequently, the application of these strategies remains a major problem within conservation in South Africa. The loose legislative framework, lack of funding expertise, and interest in conservation research offer very little towards the future preservation of rock art. These challenges in rock art conservation management highlight the need for a conceptual framework. This study undertook to conduct a conservation assessment of a sample of past interventions on rock art in South Africa in order to maximise rock art preservation.

## 1.3. Aim of the Study

This study attempts to develop a conservation model for rock art in South Africa from a management perspective. Given that in South Africa we do not have enough personnel trained in appropriate rock art site protection and management principles

and contemporary conservation theory is shifting toward principles of preventive conservation, I argue that a preventive conservation model for rock art conservation management will be ideal in South Africa. Five public rock art sites (Bushmans Kloof 03 and 09, Bonne Esperance 16, Main Caves (north and southeast), and Game Pass Shelter) from across South Africa were identified to assess the effectiveness of and to document past conservation interventions undertaken in South Africa over the last 20 years.

These sites provide a representative sample of rock art sites in South Africa. They provide diverse environmental and rock art site conditions ideal to observe the effects of conservation interventions under varied site conditions and landscapes situations. These sites are important in terms of the cultural and scientific values; they are public sites and therefore, provide an opportunity to develop a model informed by specific site settings that include micro and macro environments, site petrology, cultural context, management context, legislative framework and conservation protocol(s).

## 1.4. Management Context

### *1.4.1. Cultural context of rock art*

Southern Africa is home to multiple rock art traditions that bring us closer to understanding their cultural context. Understanding the modern and palaeo-ethnicity of the authors of rock art is a challenge that has been met with a reasonable level of success (Rifkin 2009). The rock art community today appreciates that indigenous communities of South Africa have contributed to the corpus of rock art. A large body of rock art is associated with the San hunter-gatherers (Deacon 1999), a considerable amount is attributed to Khoekhoe herdersas well as Bantu farmers. The amalgamation, interaction, and acculturation of the San with immigrant groups over the last 2000 years (Prins 2009) has resulted in rock art today being found in contemporary and multi-ethnic landscapes (Ndlovu 2005; Deacon 2006b; Prins 2009; Rifkin 2009). The Drakensberg landscape provides evidence of such contemporary societies with ancestral links to

indigenous groups. Contemporary societies with ancestral links to authors of rock art and those found in the proximity of rock art sites will be referred to here as local communities.

Contemporary conservation theory is founded on the principles of multi-stakeholder inclusion and participation. Local communities where most of the rock art is found have a big role to play in its preservation. However, issues of ownership always arise regarding rock art attributed to San hunter-gatherers partly due to the notion advanced by researchers that the San were extinct (Ndlovu 2005, 2009b; Prins 2009).Academic archaeology and heritage management in South Africa have ignored the complex phenomenon of identities and its implications for the proper management of cultural resources (Deacon 2006b).

Therefore, locally we must appreciate that rock art in South Africa is a multi-traditional resource. For example, Thaba-Sione, a rock engraving site attributed to the San is now an integral part of Tswana heritage and tradition (Ouzman 1995). The Duma Clan from Kamberg in the Drakensberg is one of the most vocal groups claiming San ancestry (Ndlovu 2005; Prins 2009). The Duma clan and their knowledge systems have effected changes in the management of rock art in the Drakensberg (Prins 2009). The request of the Duma's to perform a ritual known as the 'Eland's Ceremony' at Game Pass Shelter was acknowledged by the heritage authority of Kwazulu-Natal province in 2002 (Ndlovu 2005; Prins 2009). The 'successes' of the 'Eland's Ceremony' has seen ritual prescriptions of the ceremony being incorporated into the new Heritage Management Plan of Game Pass Shelter (Prins 2009). However, the process did not proceed without challenges; some of the management restrictions from Amafa saw a sacred process being turned into a public viewing ceremony with outsiders permitted to attend the ritual on site (Ndlovu 2005).Acknowledging the role of local communities in the management and conservation of rock art in South Africa is a new and contentious undertaking (Deacon 2006b). Pigment removal for medicinal purposes highlights the need for the inclusion of contemporary belief systems in both the interpretation and management of rock art. Managers of rock art sites consider pigment removal a

problem rather than an opportunity to engage with contemporary societies to explore the reasons for their actions.

Ritual prescriptions of the 'Eland's Ceremony' and the removal of pigments from sites underscores the significant role local communities have to play in rock art research and management. A key element of this ritual includes the "protection of the site from 'ritual pollution' carried by outsiders and unexpected visitors" (Prins 2009: 203-204). It is argued elsewhere that conservation interventions such as the cleaning of artefacts pollutes and affects the spiritual significance of cultural objects (Ndlovu 2005; Simms 2005). Such revelations do not only make a case for the inclusion of local communities' knowledge systems in policy but also emphasise the need to follow the conservation protocol, implement significance assessment and consult with local communities prior to any conservation interventions. This study takes into consideration the role of local communities in conservation in developing a conservation model for rock art in South Africa. This will be done in recognition of heritage legislation.

### *1.4.2. Legislative Framework*

Rock art in South Africa have been protected by policy for the past 100 years, initially under the Bushmen Relics Act (1911). All rock art sites in South Africa were officially protected under the National Monuments Acts (NMA) of 1969. Since 1999 all heritage resources have been protected under the National Heritage Resources Act (NHRA) (25 of 1999). The South Africa Heritage Resources Agency (SAHRA) as an agency of the Department of Arts and Culture (DAC) is charged with managing and controlling the implementation of NHRA. The main aim of the legislation and legal frameworks in the heritage sector is to preserve cultural resources.

The NHRA states that it 'aims to promote good management of the national estate, and to enable and encourage communities to nurture and conserve their legacy so

that it may be bequeathed to future generations' (NHRA 1999: Preamble). The NHRA provides the management framework for the preservation of cultural resources through a three-tier management system. The three-tier management systems denotes that SAHRA is responsible for heritage resources of national significance designated as Grade I sites. Grade II sites are the responsibility of the Provincial Heritage Resources Authorities (PHRAs). Where the PHRA is non-existence SAHRA assumes management responsibilities by default. At local level, Grade III sites are managed by municipalities. This three-tier system promotes the management of heritage resource at all levels of governance and society in order to engage and encourage participation particularly at local level (Ndlovu 2011).

The NHRA is said to have failed in the promotion and inclusion of local communities in the conservation of heritage resources. The role of local communities in the conservation of heritage resource has been shown by cases from Australia (Ndlovu 2005). This study engages with South Africa's NHRA (25 of 1999) with regards to rock art protection. The fundamental codes of pieces of legislation are to provide a framework for long-term preservation of heritage resources. Legislation protects heritage resources from what is deemed unacceptable levels or causes of damage often as results of anthropogenic forces (Scheermeyer 2005; Ndlovu 2011). This is done by making provision for the following legislative tools (Ndlovu 2011: 32):

i. providing a description of what resources are considered significant in a legislation and should be protected;
ii. setting up a criteria for determining significance and the process of approving appropriate mitigation measures, where necessary; and
iii. to determine legal means to be taken against those who violate principles that threaten the protected resources.

NHRA's aims towards heritage resources management are founded on these three elements supported by the three-tier system. The NHRA aims to introduce an integrated and interactive system for the management of the national heritage resources, lay down general principles for governing heritage resources

management throughout the Republic and introduce an integrated system for the identification, assessment and management of heritage resources of South Africa. To understand how NHRA relates to rock art conservation interventions and management I refer to how rock art is defined. Section 2(b) of the Act defines rock art as:

*Being any form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency and which is older than 100 years, including any area within 10m of such representation.*

Heritage resources are protected under Sections 34 to 38 of the NHRA. Enforcement of legislation, applications for permits, appeals, offences and penalties are dealt with under sections 48 to 51 respectively. Rock art conservation and management is undertaken following principles outlined in the sections 35 and 38 as follows:

**Section 35**- *Archaeology, palaeontology and meteorites*

(2) Subject to the provisions of subsection *(S) (a),* all archaeological objects, paleontological material and meteorites are the properties of the State. The responsible heritage authority must, on behalf of the State, at its discretion ensure that such objects are lodged with a museum or other public institution that has a collection policy acceptable to the heritage resources authority and may in so doing establish such terms and conditions as it sees fit for the conservation of such objects.

(4) No person may, without a permit issued by the responsible heritage resources authority—

*(a)* destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or paleontological site or any meteorite;

*(b)* destroy, damage, excavate, remove from its original position, collect or own any archaeological or paleontological material or object or any meteorite;

*(c)* trade in, sell for private gain, export or attempt to export from the Republic any category of archaeological or paleontological material or object, or any meteorite; or

**Section 38**- *Heritage Resources Management*

- Protects heritage resources in the face of development
- It outlines the kinds of developments a developer needs to consult with heritage authorities on the possible impacts (Heritage Impact Assessment (HIA)) of the development on resources
- It also stipulates the minimum level of information required in the HIA.

It is important to note that the provisions of Section 38(8) relating to development does not apply when a Heritage Impact Assessment is required in terms of the Environmental Conservation Act (Act 73 of 1989) now replaced by the National Environmental Management Act (NEMA) Act 107 of 1998 and the Minerals Act (Act 50 of 1991) now the Minerals and Petroleum Resources Development Act (MPRDA) Act 28 of 2002.

### *1.4.3. Conservation Protocols*

In South Africa, SAHRA does not have specific conservation protocols to address rock art conservation interventions nor does it have protocols for the conservation of any other heritage resources (Namono,pers comm. 2014; Ndlovu, pers comm. 2014; Hollman, pers comm. 2014). Amafa has been committed to the management of rock art since the late 1970s and rock art is managed under an integrated management approach known as the 'CURE Document' (Wahl *et al.* 1998; Cure 1998, 2000, 2012; Ndlovu 2005). Comparatively, in Australia rock art resources and conservation protocols are encapsulated under the concept of 'caring for country' (Lambert 2007; Marshall & Tacon 2014). Both frameworks encourage the inclusion of local communities in the management and conservation of rock art. The Australian framework attempts to redress past inequalities experienced by Aboriginal people (Marshall & Tacon 2014).

## 1.5. Environmental and Archaeological Settings

### *1.5.1. Introduction*

South Africa is renowned for its fine-line San hunter-gatherer paintings. It is a widely accepted notion that South Africa has more than 30 000 rock art sites and individual images that are over one million (Deacon 1999). Rock art includes both painted and engraved images (Rudner 1957; Deacon 1999). This study is biased towards the paintings that occur in mountainous regions namely, the Shashe-Limpopo Confluence Area, Drakensberg, the north-eastern part of the Eastern Cape and the Cederberg (Deacon 1999). A lower density of paintings is found in eastern Mpumalanga. To cover a wide and diverse pool of rock art, five (5) rock art sites from three of the four rock art regions were chosen: the Makgabeng plateau in the Shashe-Limpopo Confluence Area; Drakensberg and Cederberg (Fig. 1).

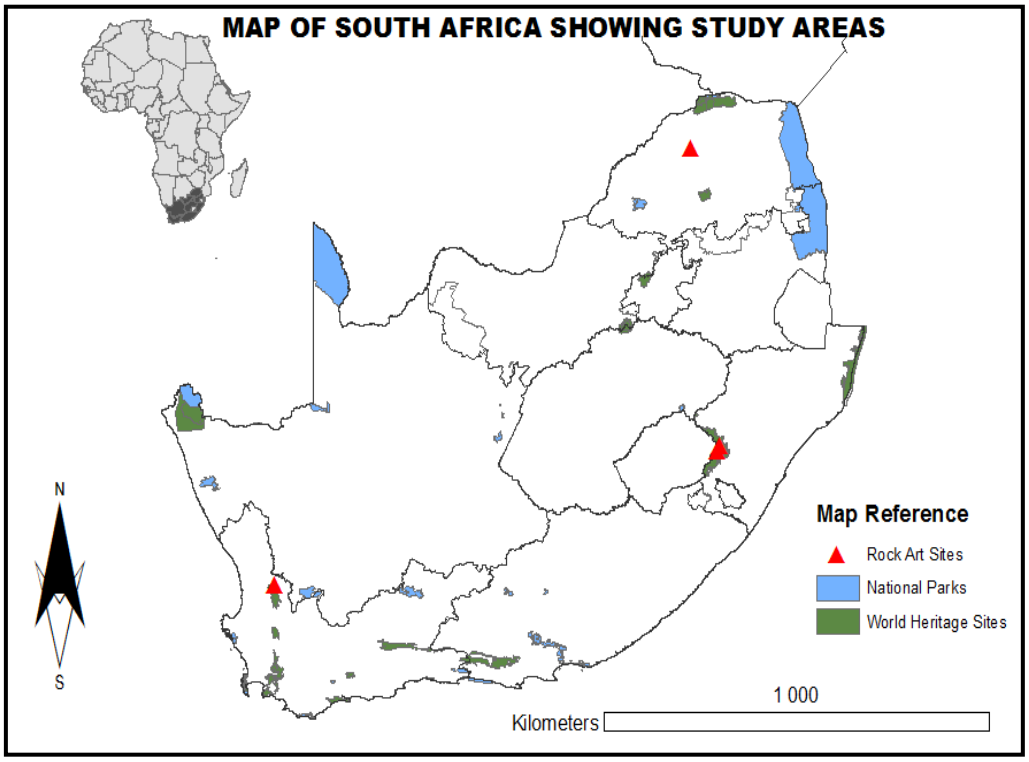



Figure 1: Rock art study regions and areas

### *1.5.2. The Drakensberg*

#### 1.5.2.1. Cultural Context

The Drakensberg is renowned for its rich natural heritage but it is not an uncultured landscape (Fordred 2011). It has a deep and rich human history beginning in the Middle Stone Age (MSA) *ca. 250 000-30 000* years ago. The recent history of the Drakensberg shows evidence of interaction between San hunter-gatherers, Khoekhoe herders, Bantu farmers and the European settlers (Ndlovu 2005; Prins 2009; Fordred 2011).

The cultural influence on the environment and landscape in the Drakensberg is approximately between the Later Stone Age (LSA) and historical periods *ca.* 30 000 years ago to the present (Fordred 2011).30 years of research which includes the work of Patricia Vinnicombe, David Lewis-Williams, Aron Mazel, and more recently Frans Prins. The long cultural history of the Drakensberg is characterised by the production of material culture, exploitation and strategic utilisation of the natural resources, and human interaction.

#### 1.5.2.2. Physical Setting

The UKhahlamba Drakensberg Park (UDP) is part of the Drakensberg mountain range and is the focus area of this study. It can be located at **29° 45' E** and to the west extending to 28° **52' E** and it runs at **28° 38' S** and **28° 46' S** from north to south. The UDP is an amalgamation of Twelve (12) protected areas consisting of one National Park, four Nature Reserves, six state Forests, and one Game reserve (Fordred 2011). The first of these protected areas Giant's Castle was established in 1903 and the latest Kamberg was created in 1970 (Fordred 2011). The UDP was declared as a World Heritage Site (WHS) in the year 2000 for its majestic and scenic mountains as well as its rich rock art heritage. The Drakensberg mountain range is the largest geomorphologic land feature in South Africa ranging from Mpumalanga through KwaZulu-Natal and into the Eastern Cape Province. From north to south it covers a distance of 150 kilometres from the Royal National Park to the Bushmen's Nek covering an area of 200 202 square kilometres (Fordred

2011; Venter 2011). The west boundary of the UDP forms the Lesotho-South Africa border where the eastern section of the mountain range is called the Maloti Highlands (Venter 2011). The Drakensberg Mountains at the foothills is as low as 1400m and at its highest it reaches 3482m. The highest mountain of the Drakensberg is called Thabana Ntlenyana standing at 3482m (Ndlovu 2005).

#### 1.5.2.2.1. Geology

The origin of the Drakensberg can be traced back to the Gondwanaland land mass (Ndlovu 2005; Leuta 2009; Fordred 2011; Venter 2011). In its current form the mountain range was created by ancient flowing waters, wind and other related weathering agents. The mountain range has been shaping and reforming over the past 250 million years. The geology of the Drakensberg is characterised by two subgroups of the Karoo supergroup, the Beaufort and Stormberg Groups (Ndlovu 2005; Leuta 2009; Fordred 2011; Venter 2011). The Drakensberg has been structurally divided into two potions which better explains its geology, the 'High and Low Berg'. The Karoo system forms part of the High Berg with the volcanic basalt that forms the mountain cap. At the foothills of the Drakensberg is the Beaufort Group which lies beneath the Basaltic lava (Ndlovu 2005). It is here beneath the Basaltic lava where the Clarens Formation or 'cave sandstone' occurs. This is the less resistant and porous layer of sandstone where rock shelters are formed at 1600 to 1800m above sea level. Below the sandstone of the Clarens Formation, is the Elliot Formation which is about 250m thick (Fordred 2011; Venter 2011).

#### 1.5.2.2.2. Climate

The Drakensberg is an inland mountain range that creates a barrier between inland and coastal South Africa. This barrier affects and influences the mesoscale climate of the plateau (Ndlovu 2005). Warm moist air from the Indian Ocean rises above the escarpment in summer when the inversion layer lifts above plateau (Fordred 2011). Evidence suggests that the climate of the Drakensberg has changed over the

years. The climate of the Drakensberg is characterised by moist air rising above the escarpment bringing summer rainfall. Precipitation occurs high up the mountains and the resulting run-off accumulates both at the top and foothills (Leuta 2009). As a result the Drakensberg is one of the least drought-prone areas in southern Africa (Ndlovu 2005; Fordred 2011; Venter 2011).

Rainfall peaks in summer between November and March with January and February producing the highest levels of precipitation (Ndlovu 2005; Leuta 2009; Fordred 2011; Venter 2011). Winters are generally dry and contribute less than 10% of the annual precipitation. The annual precipitation in the Drakensberg ranges between 1000-2000mm and summer precipitation contributes 70% of this total (Venter 2011). Nel (2009) has observed some rainfall variability from 11 weather stations in the Drakensberg for the period 1955–2000 (Fig. 2).Highest air temperatures (up to 35°C) are also recorded for the summer months. Temperature variations have been observed at Sani Pass (northern Drakensberg) and Sentinek Peak (southern Drakensberg) weather stations (Fig. 3) (Mackellar *et al.* 2014). The highest air temperatures are recorded on north-facing slopes. The mean annual temperature is in the region of 16 °C (Leuta 2009; Fordred 2011; Venter 2011). With the lowest air temperatures recorded during winter nights. The vegetation of the Drakensberg is suited to both its geology and climate.

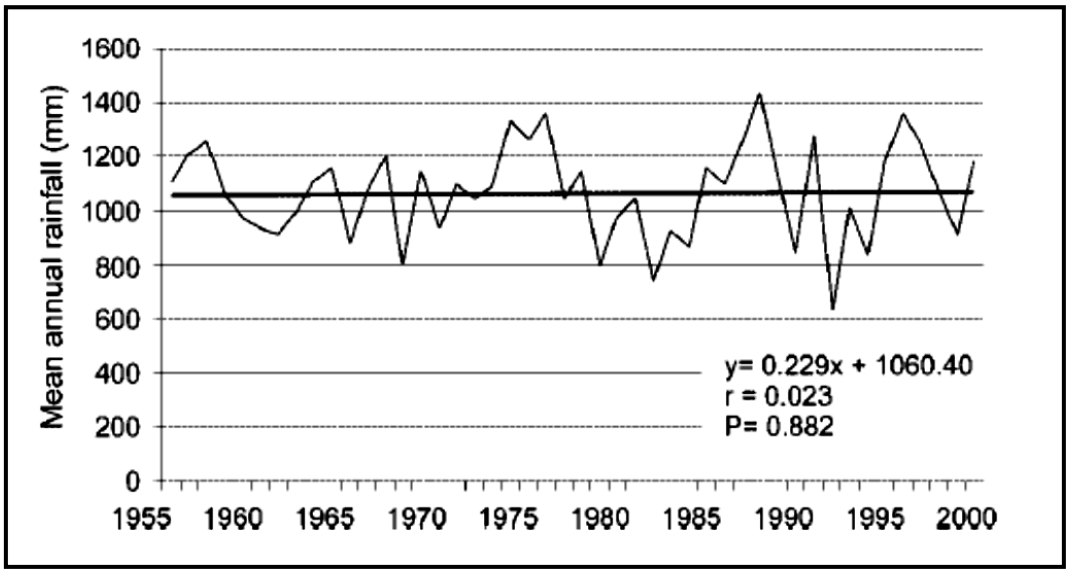



Figure 2: 50 year's rainfall variability for the Drakensberg,adopted from Nel (2009)

| Station | Statistic | Daily Air Temp. (°) | Daily Soil Temp. (°) | Rate of change air Temp. (°C/hour) | Rate of change soil Temp. (°C/hour) |
|---|---|---|---|---|---|
| *Sani Pass* | Mean | 9.7 | 14.1 | 0.9 | 0.7 |
| | Mean min. | 4.8 | 10.1 | | |
| | Mean max. | 14.6 | 18.9 | | |
| | Absolute min. | –1.6 | 6.9 | | |
| | Absolute max. | 20.8 | 24.3 | 6.4 | 4.9 |
| *Sentinel Peak* | Mean | 9.3 | 13.2 | 0.8 | 1.6 |
| | Mean min. | 5.9 | 6.1 | | |
| | Mean max. | 13.5 | 24.3 | | |
| | Absolute min. | 2 | 1.3 | | |
| | Absolute max. | 18.8 | 38.5 | 4.9 | 11.1 |

Figure 3:Seasonal temperature variability northern and southern Drakensberg, adopted from Grab (2007)

1.5.2.2.3. Flora

The physiography of the Drakensberg and its wetlands promote a diversity of plant biota (Fordred 2011). The vegetation can be divided into three main regions, the high altitude, mid altitude, and low altitude (Ndlovu 2005; Leuta 2009; Fordred 2011; Venter 2011). These three regions vary considerably but they do overlap at certain levels. The high altitude belt is located at 2865-3500m above sea level. It is characterised by plants such as the *Helichrysum hearth* as its main unique plant community. The mid altitude belt is located between the high and low berg and is likely to exhibit characteristic of both. Situated at 1830-2865m above sea level is the mid altitude belt with Passerina-Philipia-Weddringtonia Fynbos and grassland (Ndlovu 2005; Leuta 2009; Fordred 2011; Venter 2011). The Fynbos, scrubland, and woodland vegetation can also be identified within the mid altitude belt. The low altitude belt like the mid altitude exhibits characteristics of grassland vegetation (Ndlovu 2005; Leuta 2009; Fordred 2011; Venter 2011). It is however, characterised by the *Podocarpus latifolius* forest community. The low altitude belt stands at 1280-1830m above sea level. This diverse plant community supports a diverse faunal community.

1.5.2.2.4. Fauna

The UDP is habitable to over 2153 plant species. Although the UDP is not a Big Five area it has a lot to offer in terms of wildlife (Ndlovu 2005). Over 300 bird species can be identified in UDP. Forty-Eight species of mammals which include the eland, mountain rhebuck, grey rhebok, grey duiker, klipspringer, and bushbuck can be spotted within the UDP. Common animals within the UDP include the baboon, rock hyrax, and porcupine. The leopard is also an attraction spotted amongst other predators like the black backed jackal within the park (Ndlovu 2005; Fordred 2011). A further 30 species of amphibians, 18 of lizards, and 24 of snakes provide a glimpse of diversity within the UDP (Fordred 2011).

### *1.5.3. The Makgabeng plateau*

1.5.3.1 Cultural context

Edward Eastwood and colleagues (2002: 1) describe the Makgabeng plateau as the "fertile ground for both archaeologists and rock art researchers" (2002: 1). Rock art surveys of the area spanning a period of 11 years have identified and documented over 460 sites in the Makgabeng plateau and over 600 in the Central Limpopo Basin (Eastwood *et al.* 2002; Eastwood 2003; Eastwood & Tlouamma 2006). In the early 1950s Jean Humphrey undertook the first archaeological excavation on the plateau (Eastwood *et al.* 2002; Heritage Statement for the Waterberg Prospecting Rights Application, Blouberg, Limpopo Province 2013). The archaeology of the Makgabeng shows evidence of a deep prehistory beginning in the ESA, although the ESA and MSA are not well researched and understood while the LSA is mostly associated with rock art. Critical events started by the time of the arrival of both the Khoekhoe and Bantu farming communities' *ca.* 700 AD (Eastwood *et al.* 2002; Tomose 2006; Heritage Statement for the Waterberg Prospecting Rights Application, Blouberg, Limpopo Province 2013).

The population of the Makgabeng mainly comprises the Hananwa, Ndebele, Koni and Europeans (van Schalkwyk 2009a, b). The dominant Hananwa people have laid

claim to the area and were the main ethnic group at Makgabeng (van Schalkwyk & Moifatswane 1991). The relationship between the locals and European Settlers is described by many as having been amicable until the Old South African (ZAR) regime initiated plans to curb African independence which resulted into the Maleboho War of 1894 (van Schalkwyk & Moifatswane 1991; Heritage Statement for the Waterberg Prospecting Rights Application, Blouberg, Limpopo Province 2013).

#### 1.5.3.2. Physical Setting

The Makgabeng plateau, the Shashe-Limpopo Confluence Area (SLCA), the Soutpansberg, and the north-eastern Venda region make up the four rock art regions of the Central Limpopo Basin (Eastwood *et al.* 2002; Eastwood 2003; Charteris & Eastwood 2004). The Makgabeng plateau based on the river is divided into three regions the eastern, central, and western Makgabeng (Tomose 2006). The central Makgabeng is divided into farms Millbank, Old Langsine, Langbryde, Millstream, Gallashiels, Nieuwe Jerusalem, and Too Late. The eastern portion of the Makgabeng plateau is made up of the farms Mont Blanc, Bonne Esperance, Rosamond, Disseldorp, and Sweet Home (Tomose 2006; Heritage Statement for the Waterberg Prospecting Rights Application, Blouberg, Limpopo Province 2013) while the western region consists of the farms Devilliersdale, De la Roche, Groenepunt, Kirsternspruit, and Bayswater (Tomose 2006). This study focuses on the Bonne Esperance 16 in the eastern region, colloquially referred to as 'The Great Train Site'. The Makgabeng plateau is a unique region of South Africa where all three rock art traditions occur or co-occur in one site. The rock art of the area is largely well preserved but exposed to the elements which are a threat.

##### 1.5.3.2.1. Geology

The Makgabeng plateau is underlain by 2 billion years old Aeolian sediments believed to have been a result of a Precambrian desert environment. The Precambrian desert contains cyanobacteria a precursor of life on earth (Eriksson *et al.* 2000; Eastwood *et al.* 2002). The geology of the plateau is made up of the

Makgabeng and the Mogalakwena Formations of the Waterberg Group. The Waterberg Group is of Mongolian age (2070 to 1080 million years ago). The Makgabeng formation is believed to be best exposed in its structure over the Makgabeng plateau. Aeolin deposits form a large component of the Makgabeng Formation (Eriksson *et al.* 2000). The pebbly Setlaole Formation grades up into the mature sandstone of the Makgabeng Formation (Eriksson *et al.* 2000). Lithology characteristic of the Makgabeng Formation include the fine-to-medium grained quartz arenites, the finer siliciclastties and pebbly sandstones.

#### 1.5.3.2.2. Climate

Climatic variations have been observed in the past over the plateau (Tomose 2006). Modern day climate shows that the plateau and surrounding areas experience summer rainfall with an average of 350 to 650mm per annum (Eriksson *et al.* 2000). High levels of air temperatures are experienced in summer with the day temperatures reaching a maximum of 40 ˚C with a monthly average of 21˚C. Low temperatures are experienced in winter where levels could drop below 0˚C. Temperature and rainfall variations have been observed for the Limpopo province for over a century (Fig. 4 and 5) (Bharwani *et al.* 2005; Rampedi 2010; Tshiala *et al.* 2011).

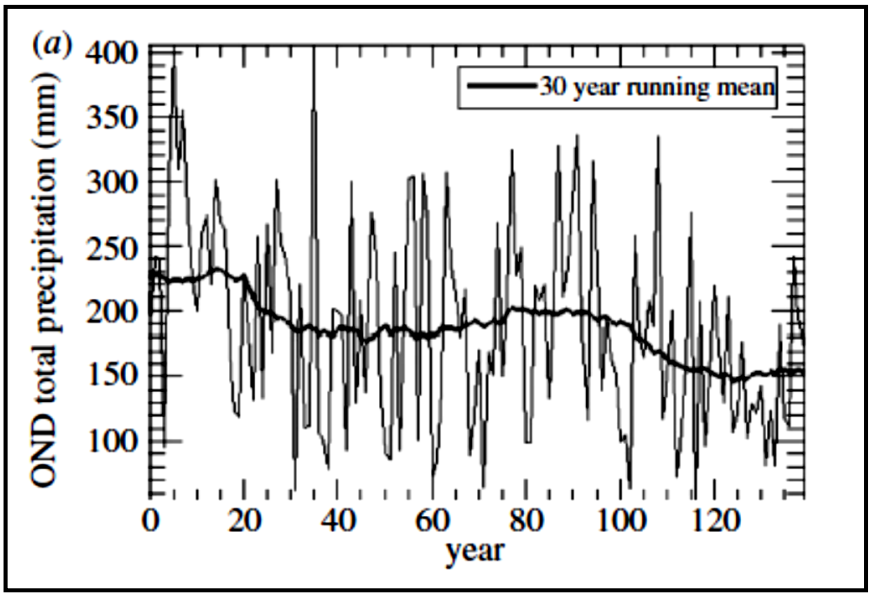



Figure 4:Thirty years mean rainfall variability, adopted from Bharwani et al. (2005)

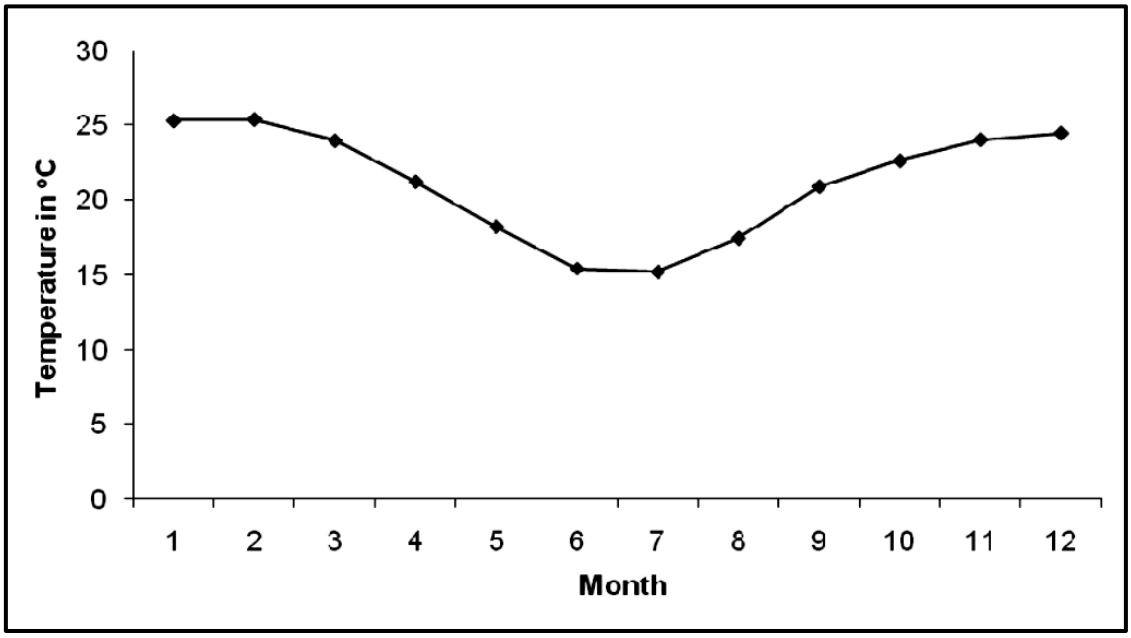



Figure 5:Monthly temperature variability, Limpopo Province, adopted from Tshiala et al. (2011)

1.5.3.2.3. Flora and Fauna

The Makgabeng plateau has diverse communities of plant species that include the African Fynbos, Riverine Forest and wetland plants like the Anne tree, woodlands and mountain plants. The plateau is generally located within a Savannah biome

(Eastwood & Tlouamma 2006; Tomose 2006). There is not much of wildlife in the plateau. Game animal are extinct and domesticates roam freely. The permanent and highly nutritious sweet grasses located within the gorge and river valleys provide a staple diet for domesticates (Tomose 2006).

### *1.5.4. The Cederberg area*

#### 1.5.4.1. Cultural Context

The Cederberg area is described as a cultural landscape exhibiting diverse heritage resources ranging from rock art to historic structures. The rock art of the northern Cederberg according to Orton and Hart (2005: 10) "is very diverse and perhaps the most fascinating and visually appealing of heritage resources in the area". The archaeology unit at the University of Cape Town has been conducting research in the area since the beginning of the 1960s. The very appealing rock paintings of the Cederberg have been subject of research in many publications (see Parkington 2003). The area does not have much to offer in terms of prehistoric occupation (Orton & Hart 2005). The MSA and LSA offer a lot in terms of the rock art and material scatter on the floor of rock shelters. The Cederberg is located in a northerly direction of Clanwilliam one of the oldest historic towns in South Africa (Orton & Hart 2005). The area thus has a long history of European settlement (Orton & Hart 2005).

#### 1.5.4.2. Physical setting

The Cederberg is located at **32˚ 00'-32˚ 45' S** and **18˚ 50'-19˚ 25' E** and some 250km north of Cape Town (Boelhouwers *et al.* 1999; Valsecchi *et al.*2013). The range covers a distance of approximately 125km in length with a varying breadth where it stretches 25km long at its widest point. It stands at 300-2150m (Brown 1991; Smith 2001; Quick *et al.* 2011). The Wilderness area of the Cederberg according to Smith (2001) covers 71 000 hectares and was the second to be declared as a wilderness area in 1973 after the Drakensberg. The mountains lie in the northern part of the Cape Floristic Region (CFR) and are largely made up of the

sandstone of the Table Mountain Group (Moore & Picker 1991; Boelhouwers *et al.* 1999; Orton & Hart 2005; Valsecchi *et al.* 2013). The mountains play a crucial role in the sustenance of life on earth; they are not only part of the Greater Cederberg Biodiversity Corridor but they provide the catchment area lying in the driest part of the south-western Cape (Brown 1991; Boelhouwers *et al.* 1999; Smith 2001; Quick *et al.* 2011). The two major rivers forming the catchment of the area are the Olifants River in the southwest and the Doring River to the northeast (Brown 1991). The physiography of the mountains allows it to be a significant conservation area globally and this can also be attributed to its geology and climate (Smith 2001; Valsecchi *et al.* 2013).

#### 1.5.4.2.1. Geology

The Cederberg is comprised of the Table Mountain Group (Brown 1991; Boelhouwers *et al.* 1999; Moore & Pickler 2005; Quick *et al.* 2011; Valsecchi *et al.* 2013). The lithologies of the Cederberg are predominantly sedimentary rocks occurring within the Ordovician to the Devenian supergroup (Quick *et al.* 2011). The range is characterised by quartzite sandstones (Quick *et al.* 2011; Valsecchi *et al.* 2013). Traces of the Malmesbury Shales Group and sandstones can be identified to the west (Quick *et al.* 2011). To the east of the range there is a clear change in the underlying geology where the Bokkeveld formation grades in (Quick *et al.* 2011).

#### 1.5.4.2.2. Climate

The Fynbos biome of the south-western Cape is characterised by a Mediterranean climate. The climate of this region is said to have been stable over time. The Cederberg experiences wet and cool winters and dry summers (Archer 2009). The mean annual rainfall ranges between 500 and 1000mm and the austral winter contributes 70 to 80% annually. The climate of the south-western Cape is influenced by the westerly winds and its associated frontal depressions that affect

winter patterns (Valsecchi *et al.* 2013). Temperature and rainfall variation have been observed in the past over the south-western cape (Fig. 6) (Archer *et al.* 2009).

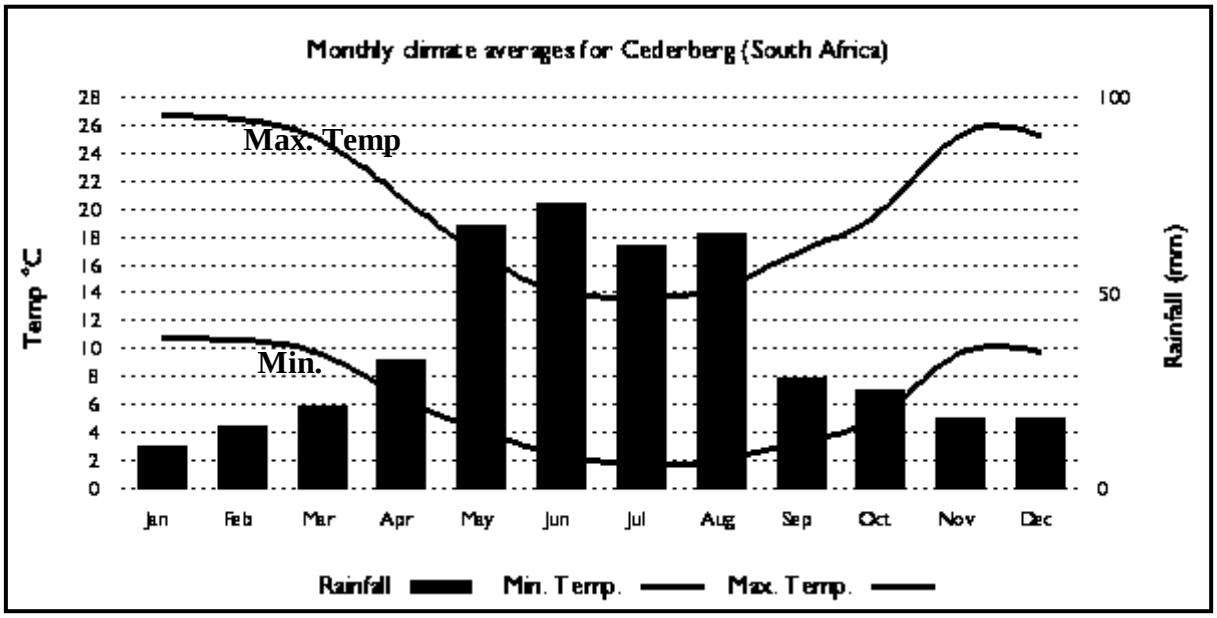



Figure 6:Monthly climate average for the Cederberg between 1950−2000, adopted from bioval.jrc.ec.europa.eu/PA/pa/32845/PA.report_32845.html (consulted February 2014)

1.5.4.2.3. Flora

The vegetation of the south-western Cape similar to the climate is characterised by the Fynbos biome. The mountain Fynbos has high levels of biodiversity and endemism and this is attributed to the stability of the climate of the region. The high levels of species richness and endemism makes the mountain Fynbos one of earth's biodiversity hotspots (Smith 2001). The evergreen shrubland Fynbos is characterised by *proteoids, asteraceous, restoids* and some commercially utilised trees such as the *Widdringtonia cedarbergesis* (Smith 2001; Boelhouwers *et al.* 1999; Valsecchi *et al.* 2013). The thicket and Fynbos are the major structural and chronological of the Cederberg; where the thicket can be found in fire protected areas unlike the fire prone Fynbos. There are 26 plant communities in the area, with 63 that are rare, endangered, and/or endemic plant species (Smith 2001).

#### 1.5.4.2.4. Fauna

Wildlife in the Cederberg thrives in the climate stable Fynbos biome 65 species of mammals, 193 of bird, 8 of amphibians, 48 of reptiles, and 14 of fish are identified within the length and breadth of the mountain range. According to Smith (2001) the Cederberg has quite a uniform diversity of fauna but where the range borders with the Karoo species that are not common to the Fynbos can be identified. These species include the aardwolf, bat-eared fox, namtap, Clanwilliam yellow fish and the black eagle (Smith 2001).

## 1.6. Conclusion

South Africa has a rich rock art heritage albeit this rock art is threatened by multiple factors that cause its decay. Several attempts in the past have been made to address the decay of rock art with little success. In this chapter I have outlined the challenges of implementing strategies for rock art conservation practice. I have also outlined the archaeological and environmental setting of the study areas as these have a bearing on the rock art landscape. In the next chapter I situate South Africa in the broader context of rock art conservation.

# Chapter 2 : ROCK ART CONSERVATION

## 2.1. Introduction

Archaeology studies the past through the analysis of material culture exposed to the elements that threaten their existence. It is therefore vital that archaeology makes efforts to preserve the subject of its research for future generations. The history of archaeological conservation shows that the discipline faces challenges of standards of good practice. This chapter engages with semantics of conservation as well as the technical, methodological, ethical, legislative and theoretical dilemmas of heritage conservation management. I situate South Africa within a global context of rock art conservation management.

### *2.1.1. Archaeological conservation*

It is difficult to pinpoint exactly where and when archaeological conservation began (Sease n.d.). Conservation discourse suggests that archaeological conservation began in ancient Rome *ca.* 100 A.D. and that craftsman and artists undertook the bulk of restoration work in all major civilizations (Sease n.d.; Caldararo 1987). The earliest evidence of treatment of paper scrolls is from China *ca.* 500 A.D. (Caldararo 1987). The Romans and Chinese observed the adverse effects of time on antiquities and realised that restoration reversed them (Sease n.d.; Caldararo 1987).

Restoration of antiquities flourished during the Renaissance in Europe with the rise of antiquarianism (Sease n.d.; Caldararo 1987) particularly with the discovery of sites of Pompeii and Herculaneum. During the Renaissance restoration work was only entrusted to people with artistic skills (Sease n.d.). Amongst the well-known artists, Piaggio and Davy experimented with unrolling of papyrus from

Herculaneum (Sease n.d.; Caldararo 1987) and Cellini worked on the Grannmede statue (Sease n.d.). Cellini was probably the first artist to provide a written account on restoration methods and procedures (Sease n.d.).

The interest of science in archaeological conservation grew in the eighteenth century and the involvement of scientists in restoration work resulted in a sharp scientific focus on procedures and the characterisation of materials (Sease n.d.; Caldararo 1987; Dandridge 2000). The greatest advancement in the treatment of antiquities perhaps coincided with the first chemistry conservation laboratory established in 1888 at the Königlichen Mussen in Berlin, Germany, with Freidrich Rathagen, a chemist, appointed its director (Sease n.d.; Matero 2006). Rathagen, perhaps following Davy, introduced a scientific approach to archaeological conservation when "he sought to understand the processes of deterioration in order to determine an appropriate method of treatment" (Sease n.d.: 158). This scientific approach formed the basis of inquiry in Rathagen's analysis of deterioration and development of solutions. Rathagen is also credited with the introduction of synthetic materials in the treatment of artefacts (Sease n.d.).In 1898, Rathagen published his work in a book entitled *Die Konservierung von Altertumsfunden* (Sease n.d.; Matero 2006). The book documents conservation techniques for treating various artefacts depending on the material constituents of the artefacts (Sease n.d.). It is this aspect of treatment that is relevant for rock art conservation.

It is difficult to determine where and when the origin of rock art conservation began. Globally, there appears to be a significant pattern during the nineteenth century toward the conservation and preservation of rock art in America, Australia and South Africa (Rudner 1989; Dandridge 2000). In America, according to Dandridge (2000), the first preservation of rock art occurred with the creation of the El Morro National Monument in 1906. In South Africa, preservation of rock art was a concern (Webb 1980; Rudner 1989) and experimentation with treatment materials on rock art and documentation of panels were of paramount importance (Rudner 1989; Dandridge 2000). Traditional treatments such as turpentine to remove painted graffiti were applied to rock art panels without a thorough

assessment of site conditions, and clear guidelines, procedures, and/or criteria (Dandridge 2000). The 1960s saw a shift towards the development and trials of more systematic investigations on factors affecting the preservation of rock art on a global scale. In themid-1970s through to the 1980s researchers in Australia, Canada, France, and South Africa began to devise scientific methods to conserve rock art (Rudner 1989; Dandridge 2000).

In 1972, under the global spotlight, the significance of conserving rock art and ancient monuments was recognised at the United Nations Educational, Scientific and Cultural Organization (UNESCO) in Paris resulting in the creation of the World Heritage Convention. Subsequently a scientific approach to rock art conservation gained momentum in South Africa, with a joint project between the National Building Research Institute (NBRI) and National Monuments Council (NMC) (hereafter NBRI-NMC project) during the mid-1970s (Loubser & van Ardt 1979; Rudner 1989). Similarly in America, the State Historic Preservation Office recognised and promoted scientific enquiry into rock art conservation (Dandridge 2000). In the early 1980s researchers in Australia increased efforts on the conservation of rock art took conservation of rock art to greater heights with the development of preservation policies and legislative frameworks. In 1981, the Australian committee to UNESCO met in Burra to discuss measures for the preservation of archaeological resources. This meeting resulted in recommendations on measures to preserve cultural heritage contained in what became known as the Burra Charter. In tandem with the Burra Charter, Australians became leading researchers in rock art conservation and their publications form the standard of conservation and preservation globally (Dandridge 2000).

#### 2.1.1.1. Rock art conservation in South Africa

With no real solution to the problems of rock art deterioration, researchers in South Africa undertook experimental work on conservation treatment. The inductive approach was employed to resolve common problems such as rock surface instability and graffiti. Paint removal and surface consolidating agents

were trialled in the 1950s in the Drakensberg to determine the ability of these chemicals to arrest both natural and human induced damage (Rudner 1989). These investigations were abandoned due to a lack of financial support and hence, the efficacy of these treatments is not documented. Similar studies were conducted in America around the same time and also abandoned for similar reasons (Dandridge 2000). Despite the lack of conclusive results on surface consolidants, silicon resins and mineral coatings continued to be used in the Drakensberg (see Chapter 4 on the nature of treatments applied and locations).

With *in situ* conservation proving to be difficult and rising levels of anthropogenic threats, conservation enthusiasts had decided to remove several rock art panels from sites for preservation in presumed safe, sturdy and controlled environments of museums (Henry 2007). In 1917, the removal of a panel from Linton farm in the Eastern Cape Province impacted negatively on paintings left *in situ* because the environment of the rock face was altered. The removed piece however remains one of the best preserved pieces of South African rock art (Namono pers, comm. 2014). However, there are ethical, practical, research-related issues with removed panels relating to the appropriate context of rock art, storage and presentation in a secondary context (Henry 2007; Pearce 2010). Panel removal is widely done in the context of CRM salvage archaeology, for example the 1973 removal for safe-keeping of rock paintings in the Wepener District which would have been flooded by the Welbedacht Dam. The removal of paintings *in situ* did not provide solutions to the natural weathering of rock art, thus a more systematic approach was sought.

In the early 1960s through to early 1970s a systematic scientific approach to rock art conservation in South Africa was introduced to investigate deterioration factors. During this time researchers were undecided whether an inductive or deductive approach was best for rock art conservation (Lipe 1974: 214; Rosendfeld 1988; Dandridge 2000). The first scientific enquiry on rock art in South Africa was carried out by the NBRI-NMC project from 1970 to 1982. The NBRI-NMC had three specific terms of reference: first, to assess and determine mechanisms of rock art decay; second, to develop and laboratory test the means,

techniques and treatments to arrest decay; and thirdly, to apply and field test the developed remedies and subsequently monitor the tests for both positive and negative feedback (Loubser & Van Ardt 1979; Rudner 1989).

The results of the NBRI-NMC project were inconclusive (Van Rijssen 1887; Deacon 1994). According to Van Rijssen (1987: 6) the "NBRI reports covering their research between 1974-1982 established many of the basic problems, but failed to explain exactly how various transformations occurred and what factors governed these transformations". The project suffered a lack of funding and hence, only two follow up studies were ever made. Therefore, recommendations for conservation management of the interventions were never implemented. Monitoring of conservation activities in southern Africa has been ineffective, hence scant data exists on the mid to long term effectiveness of trials such as those of the NBRI-NMC project.

There are three notable challenges and potential stumbling blocks to conservation practice in southern Africa. First, there is no coherent monitoring system for conservation interventions and observation of their long-term effects on rock art. I therefore argue that the assessment and monitoring of past interventions is long over-due. Second, monitoring is compounded by a lack of expertise in rock art conservation. Finally, limited financial resources in southern Africa for conservation have meant that there is an over-reliance on external donor funding. These three fundamental components have characterised rock art conservation in South Africa for the past 40 years. Deacon (2006: 305) notes that in southern Africa "the problems are seen to lie not so much with the 'hardware'- the sites themselves and the conservation methods used- as with the 'software' the intangible heritage, intercommunity relationships, and the decision-making processes regarding presentation, conservation, and management". Researchers in Africa are calling for a shift in management strategies that will see traditional and 'old-ways' (such as taboos) of caring for heritage places incorporated into current management strategies (Ndoro 2001; Loubser 2006; Clark 2009; Eboreime 2009; Ndlovu 2009b).Although a shift in management strategies is

warranted I argue that we need not separate the mutually exclusive relation of the tangible and intangible aspects of heritage, but rather manage them simultaneously. The apparent lack of technical expertise should be classified as software and this affects proper care of the hardware in conservation management.

Rock art conservation in southern Africa is inherently inductive and focuses on emergency salvage of rock art. Lipe (1974: 214) argued that archaeologists respond to threats on cultural resources "in terms of an exploitative model of utilisation of archaeological resources". In South Africa, the declaration of rock art sites as national monuments between 1936 and 1943 was in response to the imminent threats of destruction; listing was seen as the best solution for preservation (Smith 2006). The sites of Nooidtgedacht and Driekopseiland were declared national monuments between 1936 and 1943 to save them from destruction resulting from development (Smith 2006: 323). Driekopseiland was on the verge of being submerged under water due to dam construction and Nooidtgedacht was threatened by diamond mining (Smith 2006: 323). Developments are on-going and rock art conservation continues to be carried out on an *ad hoc* salvage basis and/or when donor funding is available. Such an approach is reactive rather than pro-active.

A recent more proactive, but not unproblematic, rock art conservation project was the Southern African Rock Art Project (SARAP).SARAP, initially funded by UNESCO, was established in 1998 in Pietermaritzburg, South Africa as a collaboration between the NMC, National Museums and Monuments of Zimbabwe, the Getty Conservation Institute (GCI), and the International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM) (Deacon 2006a: 308) to: raise awareness and understanding of the wealth of rock art in the subcontinent; enable those unfamiliar with rock art outside their own countries to get a better perspective on the rock art of the region as a whole; encourage southern African countries to identify rock art sites in need of protection and conservation; generate criteria for assessment of southern African rock art sites as tentative World Heritage listings; develop a collective strategy

for conservation and the nomination of rock art sites for the World Heritage List; and assist member states acquire the necessary skills and expertise to nominate rock art sites for the World Heritage List and develop management plans.

Through workshops, SARAP trained several rock art professionals in Africa on rock art documentation, drafting and implementation of management plans amongst other things. However, I argue that SARAP has not built conservation capacity for southern Africa. There remains no systematic approach to rock art conservation nor the development and implementation of monitoring programs. Three outcomes of SARAP may constitute ingredients for developing a regional conservation program (Deacon 2006a: 310). They include (i) an external stimulus (in the form of funding); (ii) guidance on how conservation should be done; and (iii) the establishment and maintenance of effective infrastructure for implementation and long-term monitoring of a sites and their management plans.

I posit that (i) and (ii) are short-term objectives, they discourage responsibility, accountability, and execution on the part of heritage organizations and research institutions tasked with the preservation of rock art in South Africa. Solely relying on donor funding and expertise is disempowering and unsustainable in the long-term and does not build capacity. Ultimately, this impacts outcome (iii) and management of rock art sites. It is pointless to keep talking about lack of conservation expertise if no effort is made practically to address the issue in the long-term. Investing in training of conservation professionals in heritage institutions is better than sporadic funding stretched between conservation projects and salvaging rock art from developments.

Having painted a picture of the conservation process in southern Africa and South Africa in particular, I now turn to the principles of conservation practice globally. I explore the contemporary conservation process, shifting principles and consider whether the inductive approach adopted in South Africa, is compatible with the modern conservation ethic. In practice, contemporary conservation and

preservation approaches violate their contexts and their principles reflect the nature of each context and the culture of local communities (Philippot 1988: 369; Ouzman 2006: 346; Norsted 2012: 30).

## 2.2. Theories and Principles of Site Protection and Management

### *2.2.1. Rock Art Conservation*

Researchers are divided about the meaning of conservation (Haskovec 1991; Dandridge 2000; Macleod 2000; Loubser 2001). Over the years conservation has been defined on the basis of principles, approaches and theory. The swells of the conservation discipline are well captured by Loubser (2001: 81) who states that "conservation is a relative concept that changes through time". Conservation theory and method has changed with time but the benefits of conservation are relatively the same. Although conservation is about protecting cultural heritage, a persistent challenge is determining what, why, how and for whom. This challenge is the basis of the dynamic nature of conservation and its fundamental principles.

The conservation process can be divided into two broad categories, the contextual and administrative approach (Loubser 2001). The contextual approach is "an assessment of the natural and cultural setting of the rock imagery" (Loubser 2001: 81). The basic principle of this approach is that the rock art is as important as the landscape and surrounding environment in which it is located. The contextual assessment must determine the fundamental link between the geological, chemical, or biological evidence and rock art deterioration (Van Rijssen 1987; Rosenfeld 1988; Walderhaug-Saetersdal 2000; Pope *et al.* 2002). This approach acknowledges that the problems of conservation vary from place-to-place depending for example, on pigments used, the mineralogy of the rock surface and its climatic and biological environments. As such there is no universal blueprint to rock art conservation practice and there are no generic interventions that can solve problems caused by specific environmental variables (Rosenfeld 1988; Walderhaug-Saetersdal 2000).

The administrative approach involves "an adoption of acceptable conservation concepts and procedures in dealing with these settings" (Loubser 2001: 81). This conservation process addresses issues such as who should or should not undertake conservation interventions, training for conservators, funding, as well as finding and using appropriate conservation treatments (Dandridge 2000; Loubser 2001; Deacon 2006a). There is a growing realisation that approaches to rock art conservation used in the past two decades have frequently had undesirable consequences (Walderhaug-Saetersdal 2000; Lambert 2007). The contextual and administrative approaches are integrated to establish the situation on the ground.

Adopting the contextual approach Loubser (2001: 81) argues that "rock art places cannot be properly conserved in a vacuum, devoid of notions about theory and practice that define such places in different ways to people with different interest and agendas". As such an *ad hoc* conservation practice violates its principles. Practice without theory is as unproductive as theory without practice (Hygen & Rogozhinskiy 2012: 4).Rock art conservators agree that the best approach to rock art conservation is a multidisciplinary approach (Fig 7.) that includes disciplines of art conservation, engineering, geomorphology, social sciences, biology and ecology (Rosenfeld 1988; Meiklejohn 1994; Walderhaug-Saetersdal 2000; Pope *et al.* 2002). A multidisciplinary approach encourages dialogue between professionals with varied expertise and a cross-pollination of ideas in order to develop appropriate conservation measures.

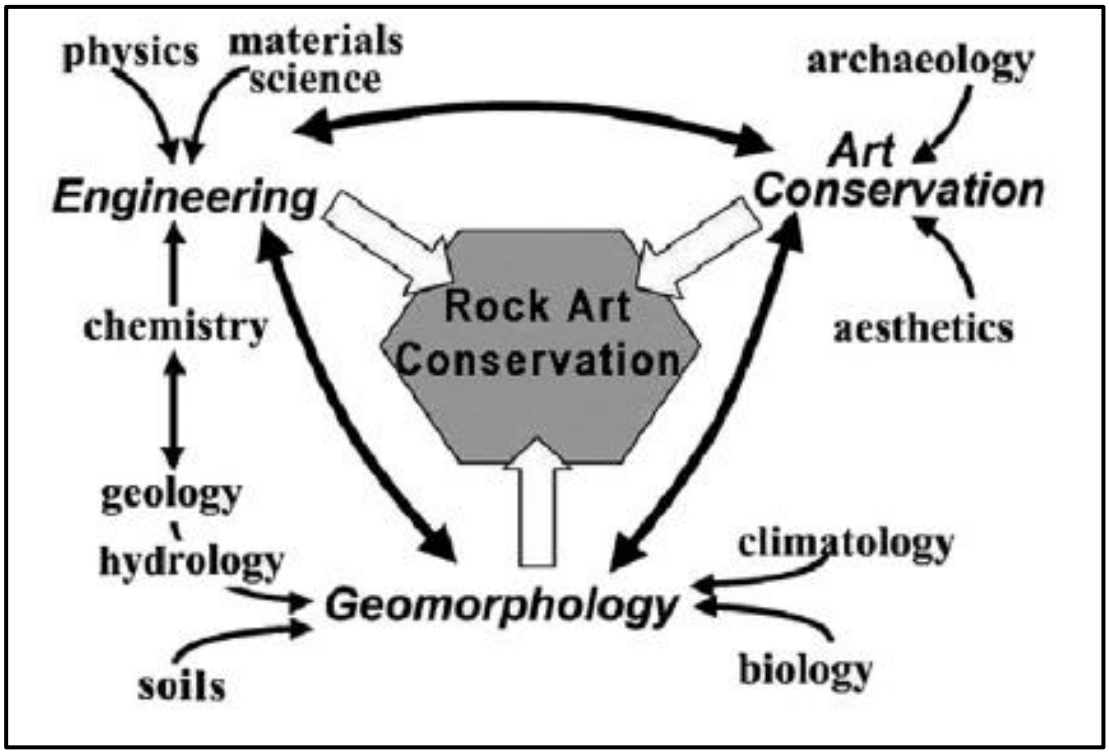



Figure 7:A multidisciplinary conservation approach, adopted from Pope et al. (2002)

Contemporary conservation approaches are consultative and inclusive of multiple stakeholders. These approaches strive to create a balance between interest groups particularly academic research and management, and academic archaeology and local communities because academic archaeology depends on effective heritage management for the preservation of the subject of its research. Loubser (2006) drawing on analogy to highlight the significant role of local communities in conservation activities, discusses rock art sites as patients in theatre or an emergency room needing medical care. In this instance, the patient's family or closest relatives (locals) have the right to decide if it is necessary to treat (remove dust, graffiti, and pollutants and/or install a drip line) the patient (Loubser 2006: 344). Conservation specialists should consult local communities prior to interventions in order to gain a broader understanding of the significance of a rock art site.

However, Loubser (2006) omits the fact that the family of the patient need to consult the medical practitioner (conservation specialist) for medical advice and expertise; it is very rarely, the other way around. Today rock art conservation is undertaken within a holistic conservation and management approach (Clarke 1978; Loubser & Van Ardt 1979; Dandridge 2000; Loubser 2001; Martínez-Arkarazo *et al.* 2009).This approach is inclusive and consultative, it takes cognisance of necessary variables when undertaking conservation interventions. The holistic approach is a significant tool in the process of undertaking conservation interventions and it is imperative that this study reviews its components as a foundation for assessing past interventions in South Africa.

#### 2.2.1.1. A holistic conservation approach

1. To initiate a holistic approach to the conservation of a site, a site must be defined; a survey must be undertaken of the site, its surroundings, and environmental conditions.

A baseline documentation of a site is a crucial step in rock art conservation because what is not recorded does not get managed (Clarke 1978; George, Jr. 1988; Philippot 1988). The concept of 'a site' restricts researchers to consider what is in front of them; the rock art images (Burra Charter 1999; Loendorf 2001) and therefore, the notion of 'a place' provides a clearer perspective of the context of an object and its location. The context of an object and/or site clearly defines the extent of the place and allows researchers to establish the sphere of influence of the site (Lambert 2007). Documentation of heritage objects should include the surrounding landscape, landform features and macro and micro-climatic conditions in order to identify factors causing the deterioration of rock art(Clarke 1978; Rosenfeld 1988; Loendorf 2001; Loubser 2001; Lambert 2007).

The sites' geological, climatological, geomorphological and biological environments exert pressure on rock art (Dardes 1998; Avrami 2000; Lambert 2007). Therefore, recording factors of rock art decay is a primary consideration of

the conservation process (Rosenfeld 1988). Accurate recording of decay factors allows for better interpretation, conservation, and management of rock art. This process also helps with documenting the history of conservation at a site for future investigation. The conservation history of a site allows for responsible conservation practice. This history also helps site managers to understand the objectives of conservation interventions and decide if interventions are ideal for a particular site (George, Jr. 1988; Philippot 1988; Dardes 1998).

2. Appropriate treatments are to be developed and tested based on information gathered at the site.

Conservation scientists clean, de-acidify and consolidate different rock substrates (Chelazzi *et al.* 2013). Any technique employed in the treatment of rock art should have ***minimal*** impact on images and rock surfaces (Hygen 2006; Joyce 2006; Matero 2006; Ouzman 2006; Mark *et al.*2009). Conservation treatments vary and range from simple to complex. As such every conservation intervention should first consider non-intrusive intervention measures and only consider intrusive ones as a last resort. The material(s) used in conservation interventions must be ***compatible*** with the original rock substrate. In addition, every conservation treatment should be ***reversible*** to allow future work to remedy any unforeseen effects of the initial intervention. However, such reversibility is impossible where chemical treatments are applied in interventions such as salt removal, graffiti removal, dust removal, and the injection of silica gels into the surface (Brink 2007).

Conservators have begun to realise this and now argue that "careful consideration must be given to the long lasting and largely ***irreversible*** effects that the treatments may have on the rock art site (Dandridge 2000; Norsted 2012).The notion of compatibility and reversibility of conservation treatments is meant to maintain the ***authenticity*** of the fabric. However, cultural resources are made of matter and will thus deteriorate. The Burra Charter (1999) and Nara document

(1994) contribute to our understanding of the concept of authenticity. Modern conservation theory is based on the principle of ***re-treatability*** which states that all conservation activities should not hinder future treatment. As such choosing appropriate methods of intervention is underlined by a thorough site condition survey.

3. Finally, suitable preventive measures should be applied on site and monitored over time for any adverse impacts.

The most important principle in conservation interventions is perhaps that "all conservation treatments should be attempted only by persons trained in appropriate conservation principles" (Dandridge 2000: 1; Loubser 2006: 340). However, people trained in relevant conservation principles are scarce. In Australia, America, Mexico and Canada there are conservation institutions with the skills to produce rock art conservation professionals. In South Africa the absence of persons trained in appropriate rock art conservation principles means that enthusiasts often take it upon themselves to do conservation work. According to Mazel (1982), in South Africa there was a lack of interest in rock art conservation in the early 1980s. Deacon, an archaeological management specialist, was interested and she attended a GCI short course on rock art conservation, site protection and management in Australia in 1989.While specialised, this diploma course was aimed at vocational training only. Deacon trained Steven Townley-Bassett in graffiti removal. Both Deacon and Townley-Bassett gained practical experience of specific aspects of rock art conservation, but neither claims to be a rock art conservator. South Africa has an urgent need for trained rock art conservators. Rock art conservation expertise will assist with establishing of the level of data and information required to develop conservation project.

Conservation treatments should be regularly monitored to assess the risks associated with the intervention(s). The intervention must be assessed on merit, looking at the effectiveness, and appropriateness of treatment in relation to the surrounding environment (Cezar 1998; Dandridge 2000). Time is an invaluable

variable in monitoring conservation interventions. The effects of the treatment may not be immediately evident and some deterioration agents are resistant to treatment. Therefore, monitoring becomes a management tool through which interventions are assessed to ensure that conservation and management objectives are met. Conservation interventions in the long run may have unforeseen and sometimes undesirable outcomes that deviate from the initial intervention goals. Monitoring strategies are therefore essential to track the evolution of rock art so as to ameliorate any negative effects of the interventions. There is a need to establish conservation protocols in policy to ensure that the principles of the value based approached are adhered to in practice.

## 2.3. Codes of ethics and legislative frameworks

Researchers have been battling with embedding, rethinking, and relocating ethics in archaeology for close to five decades. The formulation of formal statements varies from country to country based on the years in which archaeological associations and institutions were established. However, conservation ethics became prevalent globally in the early 1970s and were enshrined in legislation such as the NMA (1969) in South Africa, the National Historic Preservation Act (1966), the National Environmental Policy Act (1969) in America, the Civic Amenities Act (1967) and the Ancient Monuments and archaeological Areas Act (1979) in Great Britain (Cleere 1984; Deacon 1994; Ndlovu 2005; Fowler *et al.* 2009). Archaeological research is conducted in relation to these laws at local, provincial, national and international level. In general ethical codes emphasise and promote a systematic approach to research and heritage management. Ethics are crucial in research and practice because "they provide organisational, procedural, and ethical guidance for developing laws, policies, and procedures at global, translational, and national levels" (Fowler *et al.* 2009: 410).

Certain codes of ethics and legal instruments specifically respond to the discipline of heritage conservation (Kristiansen 1984; Princ 1984; Fowler *et al.* 2009). It is within the framework of such instruments that I consider rock art

conservation in South Africa. The main aim of these legal instruments is to protect heritage resources from anthropogenic deterioration (Brunet *et al.* 1996). Codes of ethics and legal instruments serve to provide the legal framework in archaeology within which conservation is or should be practised (Walderhaug-Saetersdal 2000). Conservation is a dynamic concept and hence its principles must also be adaptive and flexible over time. However, when legislation advances and promotes flawed notions about heritage conservation and management then there is a problem. This is the case in a number of pieces of South African legislation.

In South Africa rock art has been protected since 1911 under the Bushmen Relics Act. Several other pieces of legislation have been developed under different regimes in the political history of South Africa; the Bushmen Relics Act (1923, 1934) and the NMA (1967, 1969) (For a detailed history on legislation see Ndlovu 2005). NMA (1969) is evidence of a global trend in the twentieth century on the concept on monuments. The NMA (1969) was developed in minority-rule times and only NHRA (25 of 1999) and the National Heritage Council Act (11 of 1999) were developed in a democratic South Africa. However, the organisational institutions such as DAC, Department of Environmental Affairs and Tourism (DEAT) and in particular SAHRA have been largely unsuccessful in carrying out their rock art conservation mandate.

The NHRA and its regulations do not provide a mechanism for how to deal with ethical issues that arise when conservation is treated as a social phenomenon and this presents a challenge for sustainable rock art public visitation, conservation and community archaeology. Heritage management is influenced by the legislative framework that enforces it and its effective implementation is subject to the administrative capacity of the enforcing organisation(s). Hence the NHRA (1999) is considered to have failed in its implementation and archaeologists propose that it be reviewed. Internationally there are a couple of ethical and legal instruments that have had a positive feedback on heritage theory and practice and South Africa can learn from them.

### *2.3.1. Embedding ethics*

I posit that embedding ethics in African archaeology means decolonising and deconstructing archaeology of western ideologies, scientific relativism and the positivist school of thought; the so-called legacy of colonialism (Pwiti & Ndoro 1999). However, notions of formulating ethical codes for Africa for example, which respond to the social entities ideal for archaeological practice, may be an illusion if they are based on theories and principles formulated by researchers of western descent. Archaeological discourse is suffering from the backdrop of New Archaeology and the period of scientific entitlement. Archaeologists and anthropologists alike during the early 1970s were faced with the challenge of emerging multiple interest groups and one particular voice continues to haunt archaeological practice: the voice of local communities. Embedding ethics is a call for both professionalism and social liberation in African archaeology and heritage practice (Hall 2005).

There are two general heritage conservation and management systems: the western and traditional indigenous (Ndlovu 2009b). The western system is inscribed and enforced through legislation; the traditional indigenous system is oral and enforced through learned behaviour. The western attitude to conservation is focused on the material aspect of heritage in contrast to the traditional indigenous system that promotes both the tangible and intangible aspects of heritage. By legally protecting cultural objects, the care of heritage resources was both physically and intellectually removed from local communities and placed into the care of governments and professionals (Ndoro 2001; Ndlovu 2005; Loubser 2006; Meskell & Masuku Van Damme 2008; Eboreime 2009; Jopela 2011; Mawere *et al.* 2012). Ethical and pragmatic issues of heritage management today revolve around the exclusion of local communities in heritage management.

## 2.4. Management

CRM was founded as a study to safeguard cultural resources (Lipe 1974). The conservation ethic was born out of CRM (Fowler *et al.* 2009). Management and conservation are inextricably linked. CRM protects and salvages heritage objects from the imminent destruction of development. However, the discipline in its endeavour to protect heritage has been hamstrung by issues of ethics, professionalism, stewardship, and a host of other parties staking claim to heritage recourses. Earlier approaches to site management planning lacked dialogue and engagement with local communities, neglecting the fact that cultural resources have histories and they are imbued with meaning, agency, and symbolism. Thus, heritage practitioners have come to appreciate that there are multiple approaches to site management planning, implementation, and maintenance.

Heritage management was based on the fundamentals of a value-based approach influenced by conservation theory (Walderhaug-Saetersdal 2000: 175). The objective of a management approach derived from the value-based approach is to protect the cultural significance of a site. This has been the principle and underlying approach to the conservation of cultural resources since the 1970s. Within this approach heritage management responds to multiple dimensions of preservation, conservation and tourism. Historically management planning and practice was the difference between nature and culture resources conservation disciplines. Culture conservation has a strong focus on preservation while nature conservation promotes sustainable use through a representative sample approach (Lipe 1974; Carter & Grimwade 1997).

Representative samples refer to the preservation of "unique landscapes and bio-geographic diversity" in protected areas such as National Parks and Games Reserves in natural heritage conservation (Carter & Grimwade 1997: 46). This strategy of representative samples may be adopted in cultural heritage conservation in places and/or sites of less significance (Carter & Grimwade 1997). Ndlovu (2009b: 67) supports the use of representative samples in heritage management, by arguing that "to bridge the gap between Eurocentric physical

and African spiritual approaches, I recommend that sites for tourism should be identified as such, and those that still have spiritual value should be kept away from tourists".

The concept of representative samples is reasonable theoretically but practically it is marred with technical and socio-political bottlenecks (Carter & Grimwade 1997). Lipe (1974) suggested a conservation model for American archaeology based on the principle that cultural resources should be left *in situ* and held in the stewardship of archaeologists. Although nature and culture conservation differ in management approaches the same basic principle of conserving resources for future generations by working against factors that pose threats to resources applies. Culture conservation can therefore learn from its advanced nature conservation counter-part. The current approach for managing rock art is top-down and preservationist, and although tourism has brought notable changes in the way rock art is presented, "the way rock art is managed has not changed" (Ndlovu 2009b: 65). Culture tourism however, places a lot of challenges on conservation because it promotes preservation through use. Heritage resources are non-renewable and therefore finding a balance between use and preservation is a challenge. In South Africa, rock art public visitation studies are still grappling with developing appropriate sustainable strategies.

Heritage management plans should precisely document the history, context and condition of a site (Sullivan 1995). The history of the site captures information relating to site use, condition of the paintings and site whereas context could refer to broader issues of the landscape in which the site is located including the people and heritage agencies (Clark 2001). Heritage management plans are structural and systematic tools that capture the natural and human threats to a site to justify preservation and identify relevant stakeholders (Clark 2001).

Management plans must also be adaptive and responsive to local ideologies, cognizant of the social, economic and environmental variables in the

conservation cycle. The main aim of a conservation management plan however, is to uphold the cultural significance of a site. Other variables should be subordinated within this broad aim and only promoted if they are compatible with preservation (Sullivan 1995). The value based approach captures the *significance, conditions, cultural* and *management context* of the site (Demas & Agnew 2006). As such it is an essential tool to address issues of ownership in heritage management thus preventing conflicts and balancing values. A management plan is a significant element in the repertoire of the conservation process (Clark 2001; Matero 2006; Demas & Agnew 2006). The significance of following steps of a management plan is highlighted by incidents such as at Domboshava, Zimbabwe, where scientific and aesthetic preservation was valued over spiritual or cultural value (See Chirikure & Pwiti 2008). A management plan is the first comprehensive documentation that provides site information thereby creating baseline documentation.

### *2.4.1. Conservation and Management Practices*

#### 2.4.1.1. Realms and Spectrums of conservation and management practices

The current state of management practice globally is founded on the preventive conservation measures of the Burra Charter (1999). In light of urbanisation and infrastructure development and the many challenges it presents to the protection of heritage property, heritage management is arguably framed by the principles that provide safety nets for heritage properties. Public visitation developments range from site specific developments to local, and/or regional infrastructural developments. For the purpose of this study I am only concerned with immediate site developments which include erecting boardwalks, interpretation panels, dioramas, and floor plans. A high level of visitor satisfaction has been sought in the development of heritage sites in order to provide a long lasting and satisfactory visitor experience (Kolber & Yoder 2014). As such the conservation approach is stretched to its limits and heritage authorities tend to lose sense of what matters and priorities shift.

The fundamental objective of heritage visitation is education and engagement at all levels of society. In order to achieve this goal, heritage visitation should promote dialogue on the archaeological significance and values of heritage places through communication. Interpretation of heritage objects, places, landscapes has been identified as a possible way to communicate the archaeological significance and values of heritage places. Interpretative panels, signage, pamphlets and booklets are supplementary materials used to convey the message on cultural significance (Mazel 2012; Kolber & Yoder 2014; Ndlovu 2014b). Interpretation can also be used as a management tool that could aid in the preservation of heritage places. In this sense knowledge becomes a variable, people well informed and who understand the significance of a place are likely not to damage it but rather protect it. As such the issue becomes what meaning interpretation is conveying to the people and whether they understand.

Heritage sites are developed and their significance communicated following particular guidelines and procedures inscribed in conservation and management policy and legislation. Law enforcement serves as controls in heritage management to ensure that necessary rules and by-laws are followed when developing sites and guided tours are provided. Tour guides see to it that visitors at public sites do not deviate from the designated paths and that they do not damage heritage sites. Controls are the day-to-day activities of management such as patrols, monitoring, and path clearing amongst other things. Failure in controlling developments and communicating the significance of heritage places results in the damage of heritage sites. The development, commutation, and controls of site managements provide the baseline from which site management tools are developed and implemented.

#### 2.4.1.2. Management Tools

Management tools are the technical and methodological frameworks which are central to conservation and management principles. They are indispensable

elements in heritage management. No management tool operates in isolation. Management tools are derived from a combination of varied activities in data collection, processing, storage, and interpretation in both theory and practice in order to create a system (Stovel 1995). Monitoring programs are developed on the basis of evaluation. Monitoring is a planning and management tool that can improve conservation and management practices. However, monitoring requires an adequate amount of data, information management tools, time, responsibility and innovative as well as creative thinking (Stovel 1995). There has been a drag in world heritage system to develop monitoring methodologies and it was not until 1994 that efforts were made for systematic monitoring and reporting programs at a global scale (Stovel 1995).

Publications on monitoring dates back two decades but the dissemination of such information have been relatively slow. Monitoring is a central and significant tool in management practice and has implications for both the success and failure of conservation and management objectives. Monitoring is a strategy in heritage management that requires administrative, personnel, and organisational capacity to ensure its successful implementation (Bonnete 1995; Stovel 1995). Monitoring is "a systematic procedure designed either to evaluate a particular and sensitive situation, or to measure the state of such a situation at a particular moment in time and accurately report on it" (Bonnete 1995: 5). I however, highlight the critical elements of monitoring mentioned in the definition above, **evaluate, measure, state, time, and report.** To fully appreciate the complexity of monitoring in all its aspects we must acknowledge that it can be simple and/or complex. As such we expect there would be different methodologies, scales and types of monitoring can be expected. For the purpose of this study, I dwell specifically on conservation monitoring.

Conservation monitoring according to Cunliffe (1995: 30) "is the process of observing and gathering information on conservation activities, their context, results, and impacts. It is a process that gathers information on the conservation

status of a rock art site using standard recording methodologies that can be repeated timeously. Conservation monitoring can be target specific in such a way that it could only focus on a lichen problem at a site or the effects of the boardwalk on site. Its fundamental objective is to track the events of a conservation intervention by observing the progress, results, and impacts of treatments on the fabric through the use of indicators to improve conservation practice (Jamieson 1995). The Burra Charter (1999) makes provision for conservation monitoring which is carried out in the field through the auspices of the Department of Environment and Climate Change (Lambert 2007). In South Africa we have been struggle with monitoring of conservation activities since the birth of scientific rock art conservation three decades ago (Loubser & Van Ardt 1979; Meiklejohn 1994; Deacon 2006b).

South Africa has eight World Heritage Sites (WHS); the Mapungubwe Cultural Landscape, Cradle of Humankind, Vredefort Dome, uKhahlamba-Drakensberg Park, Isimangaliso Wetland Park, Cape Floral Region Protected Area, Robben Island, Richtersveld Cultural and Botanical Landscape (Fig.1). WHS systematic monitoring and reporting is determined by UNESCO and these sites follow UNESCO guidelines on monitoring. WHS are a first point of call in terms successful monitoring approaches and will assist with developing programs at regional and local level (Stovel 1995). There are multiple and varied challenges and problems in managing (WHS). Stovel (1995: 18-19) lists four continuing challenges in monitoring WHS:

i. Bringing approaches for national and cultural heritage more closely into harmony
ii. Improving information management within the monitoring system
iii. Ensuring that the values for which cultural heritage sites are inscribed on the World Heritage List remain at the centre of monitoring assessment
iv. Developing monitoring methodologies

To address recurring challenges different types of monitoring methodologies have been developed during the last two decades. Monitoring methodologies known as the 'Limit of Acceptable Change' and 'Commemorative integrity' have been developed and implemented in various parts of the world. Limit of Acceptable Change is good for consolidating management as standards and indicators for monitoring are based on stakeholder concerns (Pedersen 2002). Commemorative Integrity focuses on conservation of the fabric. Rock art sites are largely affected by the environment in which they are located. Thus, to fully understand the mechanisms that affect the state of rock art preservation there is a need to fully document factors causing decay. Monitoring and recording techniques are significant elements in heritage conservation.

## 2.5. Conclusion

In this chapter I explored the global history of rock art conservation within which I situated the practice of rock art conservation in South Africa. I also explored the principles of site protection and management and their ethical implications in conservation. This revealed the three fundamental conservation issues in southern Africa namely funding, lack of conservation expertise and a systematic approach to establish, implement and sustain monitoring procedures. Insights into the history of rock art conservation in southern Africa were drawn from SARAP. In southern Africa rock art conservation is *ad hoc* and strongly reliant on external donor funding. As such rock art research in the sub-continent has not built a strong body of literature on conservation. In addition, within the region there is absence of a clear understanding of the environmental, institutional (professional), cultural and management context with which rock art conservation is done. As such it is imperative that conservation principles that are tailor-made for southern African conditions are developed based on the history of rock art conservation in the sub-continent.

# Chapter 3 : ROCK ART DOCUMENTATION

## 3.1. Introduction

Methods and techniques for recording rock art are multiple and varied (Clark 2007; Dallas 2007). Their use is governed by the objectives of recording, conservation theory, the cultural background of the recorder and the methodology. Documentation is a pre-requisite in the assessment of conservation interventions. It is impossible to assess or monitor the effectiveness of conservation interventions without documentation (Reichstein 1984; Price & Doehne 2010). In this chapter, I explore the general principles of documentation and specifically focus on the principles of documentation for conservation purposes; the underpinning theory, aims and objectives of conservation documentation and the effectiveness of such techniques in practice. I approach this segment of documentation from a management perspective of rock art in South Africa.

## 3.2. Documentation for conservation purposes

Documentation of the conservation process is based on prevailing conservation ideology. For the past 40 years documentation of conservation interventions was based on the principle of minimal intervention (Norsted 2012). Emphasis was placed on the use of less intrusive methods of documentation and conservation interventions. Rock art researchers argue that the principle of minimal intervention is conceptually flawed and colours conservation as a neutral and objective enterprise (Smith 2006; Norsted 2012). Conservation interventions change rock art sites, physically or chemically in the process of ameliorating deterioration. The working ideology in contemporary conservation theory is to accept change that results due to interventions and to record the 'new' state of conditions at the site (Reichstein 1984; Norsted 2012).

The greatest challenge in rock art documentation is determining which techniques to use (Norsted 2012). All recording and intervention techniques have the potential to cause damage to rock art (Norsted 2012). The fact that no risk-free techniques for rock art documentation exist probably justifies the principle of minimal intervention at a practical level. Drawing on Letellier‘s (2007) model, the conservation process (Fig. 8) is summarised into six stages that help establish the structural nature of rock art, its environmental settings, and management context. The outcome of the conservation assessment is a management plan summarised in Figure 8. Documentation of the conservation process is carried out in three systematic stages of the conservation approach (Australian Institute for the Conservation of Cultural Materials 2002). The three levels of documenting the conservation process vary in context, scale, and detail depending on the size of the site, material, and object(s) to be recorded. It also varies depending on the objective and method used. Each documentation process serves a different purpose but they come together to function as a unit.

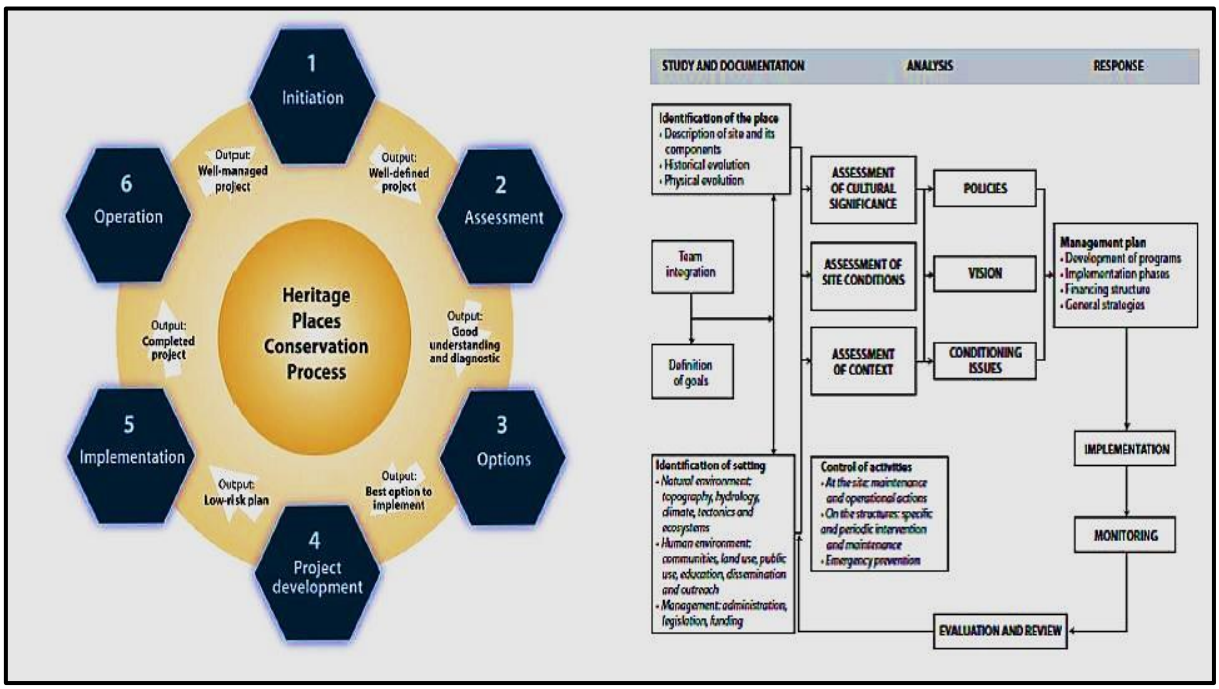



Figure 8: The conservation process and management plan modified from Letellier (2007); Castellanos & Descamps (2008)

### *3.2.1. Documentation of examination*

A condition assessment must establish threat(s) to rock art. In-depth assessments establish the structural qualities of rock art and factors causing its deterioration (Price & Doehne 2010). The assessment should include a description of the management context (Lambert 2007). The production of this information usually includes sketches, tracings, photographs to provide a dimensional, topographic, and structural record of the rock and site (Letellier 2007).

### *3.2.2. Treatment Plan*

The condition assessment and documentation lead to developing appropriate conservation interventions. The intervention technique(s) is determined by site characteristics and conditions (Dandridge 2000; Loubser 2001; Norsted 2012), weighed against "their potential adverse effects of future examination, scientific investigation, treatment, function and ageing" (Loubser 2001: 81). Intervention is frequently intuitive regardless of the confidence behind the choice of each material, "our action to handle a problem in a good way can lead to the creation of new ones" (Hygen 2006: 25). It is therefore important to test intervention procedures exhaustively before application. A treatment plan is an intermediate phase between condition assessment and application of treatment. Such a plan justifies the eventual intervention chosen because it outlines and identifies any risks and provides alternative options (AICCM 2002). Unfortunately, in South Africa conservation and rock art documentation permits are issued in the absence of treatment plans that should have formed the basis for permitting. The permitting system will be discussed later in this study.

### *3.2.3. Documentation of treatment*

Rock art is depicted on actively decaying substrates mostly sandstone which is subject to continuous change (Van Rijssen 1987). Conservation interventions alter and modify rock art, substrate, and site parameters hence such interventions are

considered a planned change in the life of rock art. Documentation of rock art before (as-found) and after treatment (created) is important in establishing previous site conditions and tracking change (Reichstein 1984; AICCM 2002; Letellier 2007). Intervention(s) may alter our understanding and interpretation of rock art because new information and hidden elements on rock art panels and about the place may emerge. The after treatment record becomes baseline data because a new site condition will have been created by the intervention. For the fact that interventions alter the parameters of heritage places and objects, documentation provides information about our actions, what we do, how (theory and methodology) we do it and why (aims and objectives) (Hygen 2006). The documentation of treatment should further include a description of the materials used, their composition, techniques and procedures adopted (AICCM 2002).

### *3.2.4. Archiving and databases*

The paucity of data on the preservation status of rock art hinders the assessment and monitoring of conservation interventions. Recorded information should be kept in secure facilities where it can be protected and retrieved when the need arises. Heritage digital repositories serve the conservation process as a cycle where the history and life of a site can be repeatedly recreated. SAHRA recently created an easily accessible, user friendly digital database of heritage sites called the South African Heritage Resources Agency Information System (SAHRIS) not only for data storage but also for facilitating research. Such a digital database creates and maintains institutional memory that will exist long after those who created it. However, the main challenge facing SAHRIS is encouraging researchers to upload material, making it difficult for SAHRA to keep record of all reports (Price & Doehne 2010).

A digital record is useful for establishing guidelines and standards in policy for documentation, monitoring, and reporting (Van Hoff 1995). As such SAHRIS can be used to track and monitor researchers if they comply or not with SAHRA standards on permitting and reporting. The request for permit is done online and the

record is kept, as such the permitting process should remain flagged until SAHRA has a report in their archives. Since information is archived based on institutional or national policy which affects the way data are archived and disseminated, it is important to provide a framework for managing heritage properties. Information may get lost if it is badly archived and this will affect conservation management.

## 3.3. Conservation Assessment Methods

Heritage practitioners and rock art researchers consider conservation assessment as a form of inquiry (Hurt 1995). The assessment of conservation interventions depends on evidence of a site's history to establish existing site conditions. As such the AICCM (2002) proposes the use of the basic guidelines of documentation as a method for evaluating conservation interventions. Such evaluation is often impeded by an inherent need to justify the effectiveness of the intervention; this ethic should be upheld in practice. Below are some of the commonly used methods for conservation assessment and associated documentation problems.

### *3.3.1. Evaluation and Monitoring*

Evaluation of heritage relies on baseline condition assessment, assessment of significance, and recording of the site's setting (Van Hoff 1995). Scant modern monitoring methods exist only in developed countries. Most African states experience an inherent lack of inventories (Eboreime 2009). Past conservation activities and procedures were either inadequately documented or they were not at all documented. Throughout the world conservation activities were carried out without proper documentation in the early twentieth century (Deacon 1994; Dandridge 2000; Hygen 2006).

Without proper documentation it is impossible to develop monitoring programs. Most significantly the lack of data affects our ability to assess, monitor, and report on the performance, results, and impacts of conservation interventions. Monitoring

programs can be developed by answering the why, how, and when of monitoring (Table 1). Reporting is a management tool that can be used to take necessary action on changes in the state of rock art. Reporting can also be used to communicate results of our actions to various stakeholders. There are various ways to report on monitoring procedure but in general a monitoring report should identify and highlight changes in rock art. The standard procedures of reporting reflect on monitoring methodologies, standards and performance indicators. Some monitoring methodologies and models include (Bonnett 1995; Stovel 1995; Pedersen 2002): Commemorative Integrity (CM), Reactive/Systematic Monitoring (RSM), National Committee Involvement Monitoring (NCIM), Pilot System Monitoring (PSM) and Limit of Acceptable Change (LAC) which I will explain in subsequent chapters.

Table 1:Principles of heritage documentation

| | |
|---|---|
| **Why** | ▪ To follow the evolution of a particular and sensitive situation, or change over time, with respect to established goals, objective, procedures, and rules<br>▪ To be aware of deviations occurring in the evolution of such a situation, and to secure all the information needed to take appropriate, timely action, if and when, necessary<br>▪ Improve site management, preventive conservation<br>▪ Improve policies (World, National and Regional Heritage) |
| **When** | ▪ Depends on the sensitivity of the issue(s)<br>▪ Established standards and performance indicators<br>Periodic<br>Ad hoc<br>Continuous |
| **How** | ▪ identify what situation is significant, valuable and in need of a careful follow-up<br>▪ set clear management objectives, determine how the situation is expected to behave in time, what results it should produce<br>▪ identify information needed to indicate change in the state of the situation or the performance of established procedures and rules |

### *3.3.2. Conservation Standards and Indicators*

Monitoring is based on simple, repeatable standardised methodologies (Ward 1995: 54). Standardised methodologies depend on indicators to objectively identify, locate and record change. Evaluation identifies behavioural patterns that indicate the performance of established procedures. Identified patterns of a situation allow for strategic performance indicators to be set (Bonnete 1995). Thus, monitoring programs can be developed with appropriate levels of data (Bonnete 1995). Standards and indicators do not provide definite answers; they merely provide means to measure change (Alcántara 2002).

Developing standards and performance indicators is a long standing challenge for heritage researchers (Zancheti & Similä 2012: v). Researchers distinguish between two sets of standards, standards in conservation and standards in preventive conservation (Zancheti & Similä 2012). Standards in preventive conservation promote and relate to sound management of conservation activities. Standards in conservation are fundamental in conservation assessments. Standards in conservation further help with establishing a working theory by setting common definitions, developing policy to maintain consistency (Zancheti & Similä 2012). Standards in preventive conservation can be defined as "a set of core principles or statement of best practice, arrived at by consensus among appropriately qualified individuals or groups" (Alcántara 2002: 11). The fundamental elements of the process of establishing standards are that it is inclusive and consultative key factors in evaluation and monitoring.

The evaluation and monitoring of conservation procedures is also dependent on identifying and establishing indicators to observe and measure change over time. Indicators are "qualitative or quantitative factors or variables that provide a simple and reliable means to measure how well a desired outcome, value, or criterion has been achieved or fulfilled" (Alonso & Meurs 2012: 2). Indicators play a critical role in conservation monitoring. Indicators are excellent tools for long-term evaluation and monitoring of trends in the evolution of a situation (Zancheti & Similä 2012). They can be used to assess the performance of policy. Standards and performance

indicators are most significantly derived from the aims and objectives of the conservation procedure and reflect the underpinning conservation theory and method.

### *3.3.3. Evaluation based on definition of Criteria*

It is important to identify the criteria used in the conservation process when assessing its results, impacts, and effectiveness. The key factor in conservation assessment is availability of documentation and the lack of it. Rock art recording is subjective. However, standards and indicators are tools that allow for conservation interventions to be assessed objectively. I assess and record the performance of past conservation procedures in South Africa based on the definition of the criteria used, define and identify aim(s) and objective(s) and the theoretical underpinning of the aim(s) and objective(s).

### *3.3.4. Conservation Assessment*

The evaluation and monitoring of conservation activities is a standing concern for heritage researchers. As such generating adequate data to develop monitoring programs is prioritised. Conservation is an integral management tool for heritage sites (Burra Charter 1999). Conservation, conservation assessment and management are considered as elements of preventive conservation, with preventive conservation being the means of effectively promoting long term preservation of cultural property (Australian Institute of the Conservation of Cultural Materials 2002). The methods of evaluation and monitoring of conservation activities are however still in infancy and heritage practitioners have been struggling with developing sufficient methods for assessing the performance of conservation activities. Every conservation assessment must be based on a clearly defined criterion by identifying and defining the aims and objective of such an assessment.

The aim of this study is to develop a conservation model for rock art in South Africa that will lead to a gradual improvement in management of interventions and

rock art sites. I assess, identify, and record the performance and impacts of conservation activities on rock art using a conservation assessment model developed by Kathleen Dardes (1998) for museums in America. According to Alonso and Meurs (2012: 2) the "assessment of conservation activities should consider the preservation of cultural significance as well as a clear understanding of the positive and negative social, economic, and environmental impacts that such activities may bring about". The 'Dardes model' as the conservation assessment approach adopted in this study is based on the conservation of collections, the physical fabric and their intangible aspects, linking the collections to the building in which they are housed. Dardes' model is a four-stage approach that provides both a conceptual and integrated analysis of heritage objects, sites, and/or places (Table 2).

Table 2:Four stages of the Dardes' model

| **Process** | **Task** |
|---|---|
| Phase One | Preparation: information-gathering prior to assessment |
| Phase Two | Information-gathering during the assessment: Site observation and interviews |
| Phase Three | Collaborative analysis and strategies |
| Phase Four | Preparation of assessment report |

For *in situ* conservation of cultural property, the conservation of the material has been the most developed area of assessment (Norsted 2012; Zancheti & Similä 2012). The cultural significance of a place is expressed and inscribed in both the material and non-material elements of a heritage place. The Dardes approach links both the material and non-material aspects of heritage objects and places; as such it is in tune with modern conservation theory and it defines the aims, objectives and theoretical underpinnings of this study. Contemporary conservation theory is founded on the concept of sustainable development. Dardes model is founded on "the development of appropriate and sustainable solutions to environmentally-

induced problems affecting collections (Dardes 1998: 1). Dardes' model has been used in museums around the world in countries like Tunisia, Brazil, and America (Dardes 1998; Teixeira Coelho & Rodegues Carvalho 2012). The model is a holistic management approach and has all the required elements for a successful assessment (Dardes 1998: 3-4) because it establishes the conditions, causative factors and risks are analysed, characterised and prioritised; and the patterns and relationships that exist amongst the institution's organisation, its collection, site and structure, and internal and external environmental conditions.

Dardes' model is used for an integrated conservation assessment of buildings and collections derived from preventive conservation (Teixeira *et al.* 2012). Preventive conservation has in the past "provided important tools for identifying, monitoring and evaluating the conditions of cultural property, and impacts of conservation activities upon them" (Teixeira Coelho & Rodegues Carvalho2012: 82). Dardes' model offers a management perspective of conservation assessment because it focuses on museum collections, buildings, and organisational policies and activities. Conservation assessment from a management perspective involves establishing the relationship between the object, heritage agency/authority, and its legislation. This approach enables exploration of different management contexts in South Africa using case studies of past interventions.

### *3.3.5. Conservation Assessment Techniques*

Techniques for assessing the effectiveness of conservation interventions work better when integrated because no single technique is sufficient to measure all forms of decay. A successful conservation assessment is based on a technical evaluation and critical judgement that goes beyond the observation and documentation of conditions and their manifestations (Dardes 1998). Technical observation and analysis is a stage in the *process* of a conservation assessment. The process by which all the factors (conditions and risks) that relate to the effectiveness of the conservation treatment are studied and prioritised is a conservation assessment (Dardes 1998; Wahl *et al.* 1998).This study has chosen a

process to identify, characterize, and prioritize the causative factors, conditions, and risks associated with conservation treatment, the Dardes' model.

Preventive conservation has provided essential tools for assessing the effects of conservation intervention on heritage objects ranging from below the surface (molecular) to surface (analytical) techniques (Price & Doehne 2010; Teixeira Coelho & de Carvalho 2012). The Choice and subsequent use of these techniques, is based on threats to be monitored. To map surface recession and monitor pigment and/or surface loss, conservators employ analytical 3D Laser Scanning, X-ray Fluorescence (XRF), Energy Dispersive X-ray Analysis (XDX), Laser-Induced Breakdown Spectroscopy (LIBS), and Neutron Activation Analysis (NAA) (see Kuckova *et al.* 2005 Hall *et al.* 2007a; Cotte *et al.* 2009). Techniques such as Ultrasonic Measurements, Thermography, Magnetic Resonance Imaging (MRI), Attenuated Total Reflection (ATR, Raman Spectroscopy, and Diffuse Reflectance Infrared Fourier Transform (DRIFT) are used to go below the surface and investigate structural stability and cohesion (see Kuckova *et al.* 2005; Price & Doehne 2010; Frost & Palmer 2011). These techniques provide a broad spectrum of situations to monitor the effects of conservation treatments on rock art.

Techniques mentioned above cannot be used in the assessment of conservation interventions in South Africa there is no baseline data. I have thus chosen photography as an analytical tool to assess and monitor the effectiveness of conservation interventions in South Africa. Photography has a long history of use in both recording and conservation of rock art in South Africa (Rudner 1989; Deacon 1994; Maggs & Ward 1994; Ward 1997). With the development of digital image enhancing tools photography has become a chief tool in the assessment of conservation interventions based on its affordability, safety and the availability of hundreds to thousands of images (Stuart 1978; Maggs & Ward 1994; Ward 1997; Brady 2006). The problem with photographic monitoring is the use of uncalibrated images captured at different times of the year and day (Price & Doehne 2010). The

lighting and detail of these photographs varies. This is a major concern in conservation practice and this study takes cognisance of this challenge.

## 3.4. Conclusion

This chapter reviewed the basic principles and issues in rock art documentation based on two hypotheses: one for research, the other for conservation. These two processes differ in detail, objectives and scope depending on the nature of the rock art site. The principle of minimal intervention is fundamental in documentation and all interventions should be guided by it in practice. Contemporary conservation theory should uphold this ideology. For this project, several conservation assessment approaches that have been previously used to assess the performance of conservation activities were considered. I adopt Kathleen Dardes' (1998) conservation model developed for museums in America. Although a museum and *in situ* environment are different, Dardes' model is a holistic management approach for integrated conservation assessment based on the principles of preventive conservation and is ideal here.

# Chapter 4 : ROCK ART DETERIORATION AND TREATMENT

## 4.1. Introduction

In this chapter I explore elements that affect and/or control the state of preservation of rock art and techniques that can be employed to ameliorate decay. The pigments mixture used in rock art, rock substrate and the surrounding environment influence the resistance and deterioration of rock art sites and paintings. The relationship between rock art and its geological, chemical and biological environment is important in understanding the processes of deterioration. Conservation studies distinguish between two types of cultural stone properties (Price & Doehne 2010). In heritage conservation of stone monuments different consideration is given to the buildings and to rock art. Rock art is depicted on stone that is actively embedded in the natural process and is subject to active cycles of hydrology, geology, climatology, and biology (Pope *et al.* 2002).

Although buildings are exposed to natural elements they are not actively embedded in the natural cycle, however, the conservation of stone buildings is more or less similar to rock art conservation in terms of treatments and conservation intervention methods used (Pope *et al.* 2002; Price & Doehne 2010). The conservation of stone monuments and/or buildings has made significant strides in the treatment of weathering and decay that rock art conservation can adopt (Price & Doehne 2010).

With reference to Bushmans Kloof 03 and 09, Bonne Esperance 16, Main Caves (north and southeast), and Game Pass Shelter, I consider how the following elements act as weathering controls: the pigment mixture and adhesion to the substrate and how this influences preservation; the composition of rock substrates- its structure and how this influences the stability or deterioration of paintings; and the environment and how it affects interfaces between the substrate and paintings and individually how it affects either the substrate or pigments.

## 4.2. Controls of deterioration

The characterisation of elements making up paintings is imperative in understanding the long-term preservation of pigments (Johnson 1957). Authors of rock art around the world commonly used similar minerals in the form of red, black and white. Other pigments include shades of orange, yellow, brown, and green. Red pigments are mainly ochre or haematite. The composition of both the white and red pigments has been identified with relative success while black pigments are difficult to elucidate (Table 3) (Scott & Hyder 1993).

Table 3:Pigment colours and composition

| **Pigment Colour(s)** | **Mineral Constituents** | **Chemical Formulae** |
|---|---|---|
| White | Bees wax, punic wax, huntite, halloysite, shell white | $Mg_3Ca(CO_3)_4$ |
| Red | Ochre, magnetite, carbon (heated ochre) | $Fe_2O_3$; $Fe_3O_4$; $C_4$ |
| Black | Charcoal, amorphous carbon, manganese | $C_7H_4O$; C; Mn |

The weathering and resistance of pigments depends on the degree of adhesion of the painting to the rock, the nature of the pigments and its binders, and the way the pigments are applied to the rock (Meiklejohn 1994; Rahim & Komally 2011). The deterioration of paintings based on the physical properties of pigments and their application can be summarised as follows (Meiklejohn 1994: 5; Rahim & Komally 2011: 275– 276);

- dry pigments and those applied as a plaster can easily be removed by rubbing and may rapidly deteriorate;

- pigments that are more fluid can penetrate deeper into the rock making them more durable;
- paintings that are comprised of large particles are unable to penetrate deeply into rock pores and are more prone to deterioration; and
- small particles can penetrate deeply into the rock pores and are less prone to deterioration.

The surface on which paintings are applied also plays an active role in the deterioration of pigments (Hall *et al.* 2007a, b; Venter 2011). Preparing the rock surface changes the physical structure of the rock (Hall *et al.* 2007a, b; Meiklejohn *et al.* 2009; Venter 2011). Smoother surfaces are prepared using a grind stone. Prepared surface allows deeper penetration of paintings into rock pores compared to rougher surfaces (Hall *et al.* 2007a, b; Meiklejohn *et al.* 2009; Venter 2011). Surfaces are also prepared by adding a plaster layer on the rock. Similarly this affects the nature of pigment deterioration (Venter 2011). Pigments are themselves applied using various techniques including fine brushes, twigs and fingers. These techniques influence the degree of adhesion and penetration of paintings (Meiklejohn 1994; Rahim & Komally 2011).The durability of pigments is also influenced by substances used to bind the minerals together (Scott & Hyder 1993).Identifying binding media used in paintings is a complex process that considers the inclusion of foreign material in the pigment mixture (Scott & Hyder 1993). Animal blood and fat, plant oils and sap have been identified as binding media (Hall *et al.* 2007a, b). Ethnographic accounts from the Maloti-Drakensberg confirm use of blood (particularly that of eland) and animal fat as binding matter (Hall *et al.* 2007a, b).

The weathering and resistance of pigments is influenced by the interaction between the pigment and rock surface and the successive pigment layering. This interplay is influenced by the behaviour of pigments in different microclimates (Ford *et al.* 1994; Hall *et al.* 2007a, b; Arocena *et al.* 2009; Meiklejohn *et al.* 2009; Hall *et al.* 2010). The relationship between pigments and their microclimate is important for devising appropriate intervention measures (Ford *et al.* 1994; Hall *et al.* 2007a, b;

Arocena *et al.* 2009; Meiklejohn *et al.* 2009; Hall *et al.* 2010). The nature of pigments and their exposure to elements shows that changes in environmental conditions can affect the state of preservation of pigments (Scott & Hyder 1993; Meiklejohn *et al.* 2009; Hall *et al.* 2010). Yellow ochre from several rock art sites of the Chumash tradition in California, America may have changed to red over time as a result of long-term exposure to extreme temperatures (Scott & Hyder 1993). Huntite used in white clay may change to whewellite reacting to both temperature and moisture (Ford *et al.* 1994). The reaction of pigments with the rock substrate may also change mineral composition of paintings. This may be influenced by the chemical or physical alteration of the rock structure and chemistry.

Weathering of the rock can occur mechanically, chemically and/or biologically (Rahim & Komally 2011). To study the processes of weathering, the underlying rock substrate must be characterised in order to understand its resistance and susceptibility. Stone characterisation is not an end in its self. As such efforts should be made to quantify decay. According to Price and Doehne (2010: 2) stone may decay by gradual weathering, leaving a sound surface behind; large scales of rock drop away in one episode; surface erupting into blisters; and sometimes the stone loses integrity and simply crumbles away.

The physical structure (pore space, size and geometrical shape) and material composition of the rock are factors that determine the local balance and the type of weathering the rock undergoes (Camuffo 1995; Leuta 2009; Meiklejohn *et al.* 2009; Price & Doehne 2010; Venter 2011; Rahim & Komally 2011; Bemand *et al.* 2014). The majority of rock art is executed on sandstone albeit these differ widely in material composition and structure (Rosenfeld 1988; Meiklejohn 1994; Leuta 2009; Venter 2011; Fernandes 2014). Sandstones are principally characterised by core elements (quartz), material grains, cementation and trace elements (feldspar) as well as pore spaces (Rosenfeld 1988; Hoerlé 2006; Fordred 2011; Bemand *et al.* 2014). Sandstones are less resistant and porous (Meiklejohn 1994; Fordred 2011; Bemand *et al.* 2014).

Weathering of porous stones occurs as a direct or indirect result of water (Bemand *et al.* 2014). The hydrological properties and porosity of a rock can induce chemical and mechanical weathering (Leuta 2009; Venter 2011; Bemand *et al.* 2014). Evidence from the Drakensberg suggests that porosity and permeability affect the rate of sandstone weathering and that of paintings (Leuta 2009; Meiklejohn *et al.* 2009; Venter 2011). The weathering of sandstone is underlined by the compromise of the rock's pore characteristics through increasing the pore sizes, creation of new pores, and transportation of material solution in pore spaces (Camuffo 1995; Leuta 2009; Venter 2011; Bemand *et al.* 2014). The porosity of a rock "is defined as the ratio of the volume of pore space to the bulk of the volume material" (Bemand *et al.* 2014: 245). The pore characteristics (size, geometry, connectivity, and infilling) of a rock provide resistance to environmental elements thus acting as weathering controls (Bemand *et al.* 2014).

The geological, climatic, and biological environments influence the deterioration of rock art (Rosenfeld 1988; Rudner 1989; Fordred 2011; Venter 2011). To elucidate the processes of decay research on weathering mechanisms should focus on monitoring environmental variables of temperature and moisture. Until recently there were no known published works from South Africa focusing on the monitoring of rock temperature for investigating weathering processes (Meiklejohn 1994; Meiklejohn *et al.* 2009; Hall *et al.* 2010). The deterioration of rock art in southern Africa is largely due to the weathering of the rock where images are located (Meiklejohn 1994; Arocena *et al.* 2009), with moisture and temperature being the main culprits. New observations suggest that there may have been a misdiagnosis on the deterioration of rock art where images are painted on a clay-based ground; in this case pigments peel off in layers rather than flaking with the rock, as a result of the weathering of the rock base (Hall *et al.* 2007a, b; Meiklejohn *et al.* 2009; Hall *et al.* 2010; Venter 2011).

Recent research has broadened the spectrum on mechanisms of decay by shifting from investigating the weathering of the rock where paintings are located, to study the interactions and interface between the rock and pigment and that of pigment to

pigment within the paintings (Hall *et al.* 2007a, b; Arocena *et al.* 2009; Meiklejohn *et al.* 2009; Hall *et al.* 2010; Venter 2011). To elucidate the active weathering processes threatening the long-term preservation of rock art a range of microclimatic variables (see Meiklejohn 1994; Hoerlé 2005, 2006; Hall *et al.* 2007a, b; Arocena *et al.* 2009; Meiklejohn *et al.* 2009; Hall *et al.* 2010; Venter 2011; Fernandes 2014) have been investigated. These include temperature, moisture, wind, and solar radiation. Natural and human-induced environmental change on a local and regional scale influences the weathering of the rock and paintings. Weathering studies from the Drakensberg show that changes in temperature and moisture regimes have an effect on rock art deterioration. Changes in environmental conditions may compromise the stability of the clay-to-rock and that of clay-to-pigment, thus, making paintings susceptible to other forces of erosion (Hall *et al.* 2007a, b; Meiklejohn *et al.* 2009; Hall *et al.* 2010; Venter 2011).

## 4.3. Rock art decay and decay treatment

### *4.3.1. Anthropogenic destruction*

Rock art is described by Lambert (2007: 6) as being "paradoxically both fragile and enduring". Factors causing the deterioration of rock art are both natural and human-induced. Natural and anthropogenic factors causing rock art deterioration have an equal level of impact because even if management practice can keep vandalism levels to a minimum, natural weathering and pollutions will still threaten the long-term preservation of rock art. Natural forces that threaten rock art preservation include factors such as fire (wild fires), hydrology, micro-organisms, livestock, insects, temperature and precipitation. Anthropogenic destruction can result due to infrastructural development, fires (human-induced), vandalism (intentional and unintentional), neglect, as well as cultural and management use. Anthropogenic destruction of rock art that results due to management practice is significant in this study as this reflects on poor management and neglect of heritage resources by managing authorities. There is however, an ethical and empirical issue that arises pertaining to the use of rock art and the damage that results.

### *4.3.2. Damage Treatment*

Conservation treatments applied to ameliorate decay include physical, mechanical and chemical methods (Dandridge 2000; Hansen 2003; Martínez-Arkarazo *et al.* 2010). Conservation treatments can be direct or indirect. Direct conservation treatments are from the field of conservation sciences and these include the cleaning, deacidification, and the consolidation of various cultural resources (Chelazzi *et al.* 2013). Indirect conservation treatment are said to be originating from the field of management and this is largely based on the manipulation of the environment surrounding rock art sites (Clark 1978; Ramírez & Valcarce 2003). Indirect conservation treatments and intervention measures are grounded in preventive conservation and are preferred over direct measures (Clark 1978; Ramírez & Valcarce 2003). However, the natural weathering of the rock substrate and subsequently the rock art can never be eliminated and so require direct interventions (Cezar 1998).

#### 4.3.2.1. Water Impact

Major deterioration of sandstones and carbon-based art is due to the direct or indirect impact of water (Bemand *et al.* 2014). Water precipitates in various forms and weathers stone mechanically and chemically. The presence of water also induces biological weathering through the growth of bio-organisms. Paintings are generally found in mountainous areas with heavy precipitation. Paintings are located in shelters where they may be shielded from direct impact of rainfall as such it is important to consider other sources of moisture such as groundwater, seepage, mist and humidity (Venter 2011; Bemand *et al.* 2014). However, some rock shelters have a degree of exposure tothe elements (Brink 2007; Hall *et al.* 2007a, b; Arocena *et al.* 2008; Meiklejohn *et al.* 2009) and so it is important to consider all sources of moisture and how they impact on paintings.

<u>Mineral Dissolution and Accretion</u>

All minerals have a degree of solubility in water (Walderhaug & Walderhaug 1998). Surfaces exposed to water are dissolved by precipitation (Walderhaug & Walderhaug 1998). Water percolates through bedding planes dissolving minerals, washing them out on the rock surface. Acid rain (carbonic and sulphuric) dissolves minerals into a solution. Hydration and oxidation cause mineral dissolution and leaching which alters the chemical composition of a rock (Brink 2007), reducing the strength of the rock. Leached minerals stain and coat rock surfaces often obscuring paintings (Lambert 2007).In addition, the concentration of minerals on the rock surface may react chemically with paintings. Evaporation may result in the deposition of soluble salts on the surface.

### Salt Decay

The seepage of snow or rainfall from the surface of the bedrock through bedding planes and fissure may introduce soluble salts and/or mobilise interstitial salts (Lambert 2007). Dissolved gypsum in sandstone may be deposited on the rock surface as a white efflorescence (Venter 2011) through a wetting and drying cycle. Furthermore, this cycle of salt crystallisation can cause the expansion and contraction of gypsum more than its size creating instability within the rock (Lambert 2007). The white efflorescence may also induce chemical reactions when changes in the environment occur (Bemand et al. 2014).

### Direct water erosion

Water running down the surface causes physical erosion of the rock and paintings. This occurs during sustained periods of rainfall and due to the melting of snow (Lambert 2007). The exact effects of direct water erosion are difficult to elucidate but they usually cause loss of pigment and discolouration. Direct water erosion is often common in high lying areas or mountainous areas and/or plains like the Drakensberg and Cederberg. Prevention of direct water erosion in shelters is straightforward and employs simple water diversion techniques and drip lines (Lambert 2007). Drip line interventions are a common technique employed in ameliorating water damage to rock art in South Africa. Hence, drip line

interventions are a significant part of this study and will be assessed using case studies from the Cederberg.

#### 4.3.2.1.1 Drip Lines

Conservation treatments for water-related damage constitute indirect or passive conservation measures. Water runoff is addressed using internal and external water diversion techniques (Brink 2007). A common technique to deal with direct water erosion is the artificial drip line (Loubser & van Ardt 1979).Drip lines may be used to divert water seeping from the roof or along the wall of a rock shelter or panel. Where the angle of the overhang is obtuse, artificial drip lines are used to improve the efficiency of the natural drip in a shelter. For drip lines to be effective they must be strategically placed within the shelter. Placement of drip lines must be guided by outcomes of a thorough assessment of seepage patterns and site conditions. I now draw on case studies from around the country to explore the use of drip lines in South Africa.

### 4.3.2.1.2. CASE STUDIES: SECTION 1

1. Bushmans Kloof 03, Cederberg, Western Cape

**Box 1: General Site Information**

**Site Name**: Bushmans Kloof 03 **Alternative Name**: Sonja's Lower Cave **Site I.D**: BSK 03

**Panel #**: Main Panel **Managing Agency**: Heritage Western Cape (HWC**)** **Date**: 05/July/2014

**Farm Name:** Bushmans Kloof 179 **GPS File**: **S** 32° 05' 53.8", **E** 19° 06' 44.8'' **Photos**: SARADA

**Aspect & Angle**: South Facing **Site Dimensions**: (C: +30m x 4m x 5m) **Site Type**: Shelter

**Existing Documentation**: Full site record filed with the Bushmans Kloof Reserve **Samples**: No

Site Description and Material Characterisation

BSK 03 is situated on the northern bank of the Perdekraal River, downstream several meters from the main reservoir. The site is not easily accessible because, the river has cut quite deep into the sandstone to form high, steep cliffs on the northern bank which is characterised by extensive, though shallow, shelters. The site is located at 416 m above sea level.

There are several vegetation species around the site growing on the edges of the river. The rainy season in particular induces growth of a variety of species such as the *Metrosideros angustifolia, Brabejum stellatiform, Rhus scytophylla, Cassine peragua, Heeria argentea, Euclea linearis, and Diaspyros glaba*(Mguni 2007). The

vegetation is mostly located on the lower ledge of the shelter and does not pose any threat to the paintings except for large trees to the western end of the shelter. The vegetation may provide protection against wind.

The images are executed the Table Mountain Sandstone. The images were painted using red, orange, and black pigments. The condition of the paintings ranges from well to poorly preserved. Some of the images have faded and it is difficult to identify them. The images depict various subject matter including human figures, animals, and therianthropes.

Conservation Condition Assessment

The site is predominantly threatened by natural processes of deterioration. No human induced types of deterioration were observed during fieldwork. Although visitors could be the sources of dust visible at the site it could also be naturally induced. Dassie urine and droppings as well as bird droppings were observed at the site but do not pose immediate danger to the paintings. Damage at the site is indirectly or directly water related. Wash zones, seeps, soluble and insoluble salts, abrasion, mineral accretion and dissolution and the growth of micro-organisms such as lichen, algae, and bacteria all pose potential threats to the site (Fig. 9). However, the effects of direct water erosion and mineral dissolution are major problems affecting the rock art. Two artificial drip lines were installed to try ameliorate the effects of water on rock art (Fig. 10).

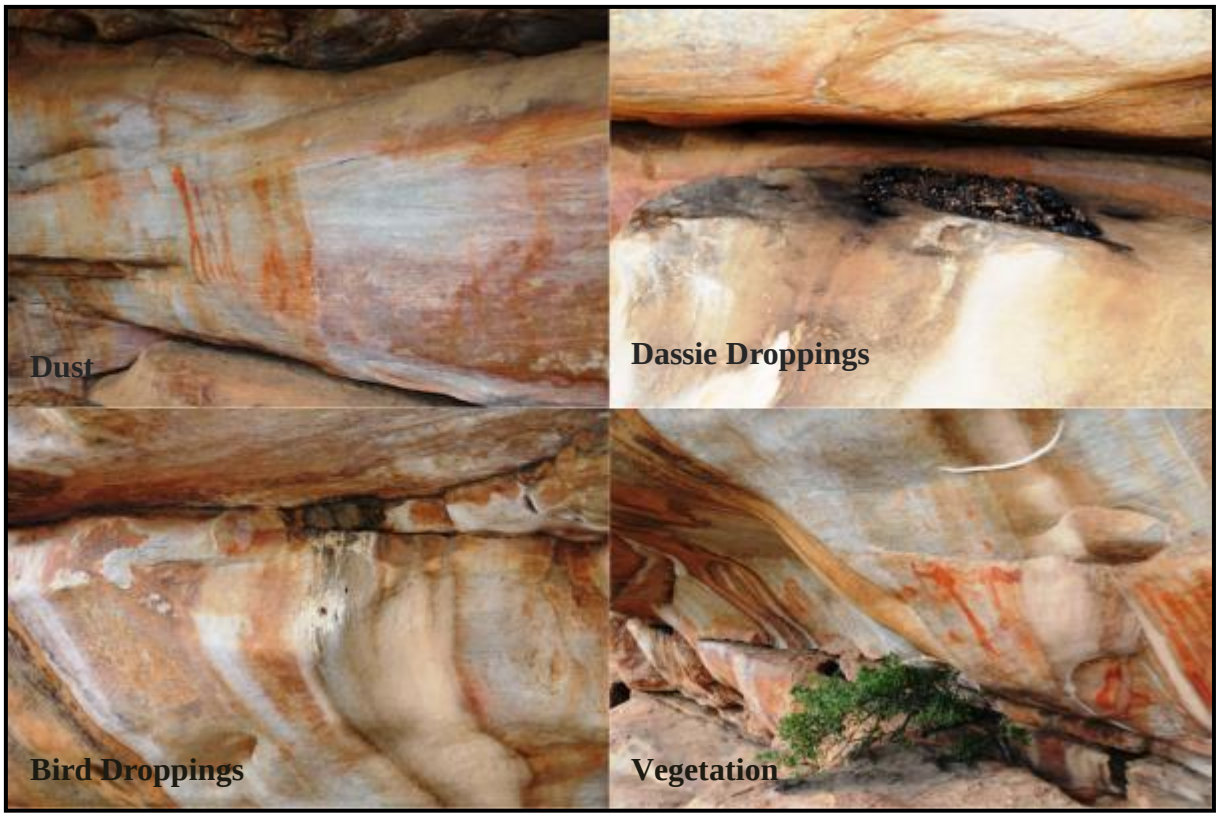



Figure 9: Factors causing rock art deterioration at BSK 03, Cederberg [Photos by Elijah Katsetse: 2014]

An isolated damp area was observed close to the floor of the shelter below the main panel. It should be said that field work was conducted at the beginning of the rainy season, however, no water seepage was observed. Monitoring of the drip should be done during winter when it is raining and after snow events to observe the effect of the melting snow. However, other researchers have done the effectiveness analysis of the drip and I use their observations in this study.

Past Intervention(s)/Treatment(s)

Two artificial putty drip line swere installed around the 1970s by Jalmer and Ione Rudner, to divert water away from the cluster of images below the drip. No previous documentation of the intervention was found during and prior to fieldwork. This documentation would have been useful in identifying the reasons for the intervention and with monitoring its results.

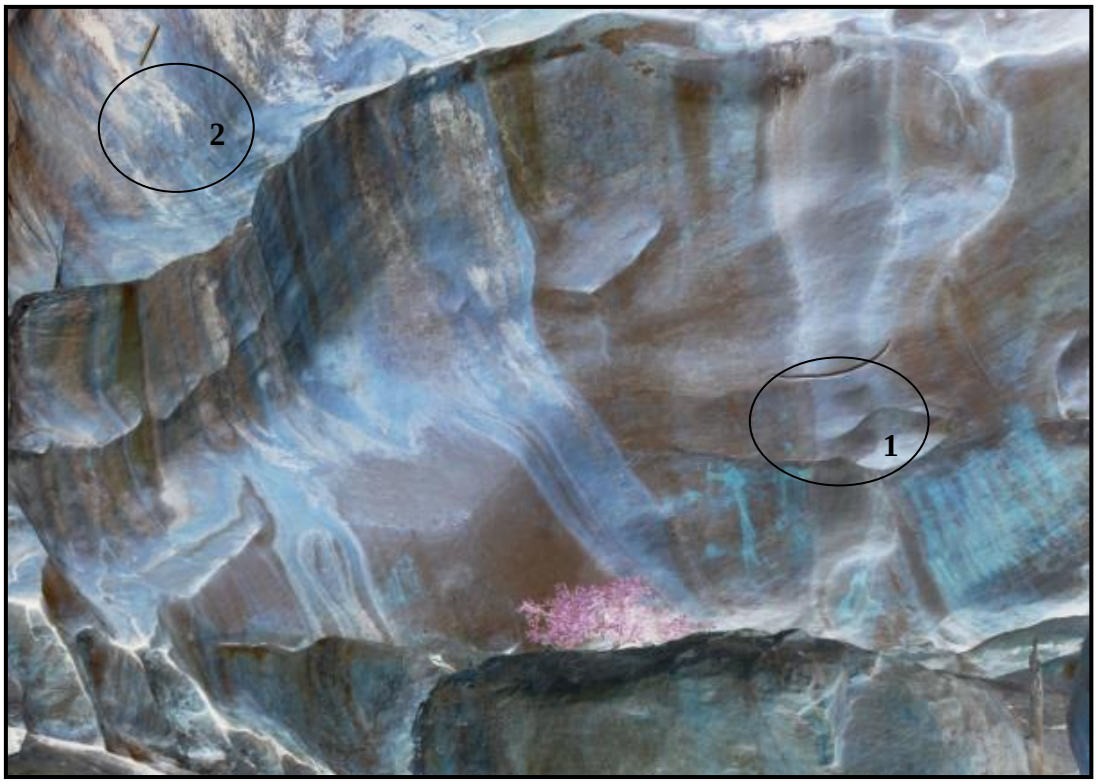



Figure 10: Drip lines interventions at BKS 03

Monitoring of artificial drip lines in the Western Cape was done as part of the SARAP training program in 2009 but the report is not yet published. The drip lines are not effective and are probably impacting negatively on the images particularly on the main panel (Mguni 2007). The drips were probably experimental work and are cosmetic because they appear not to be performing their function(s) (Fig. 11a-c). The effects of the drip line could not be observed during fieldwork because it did not rain.

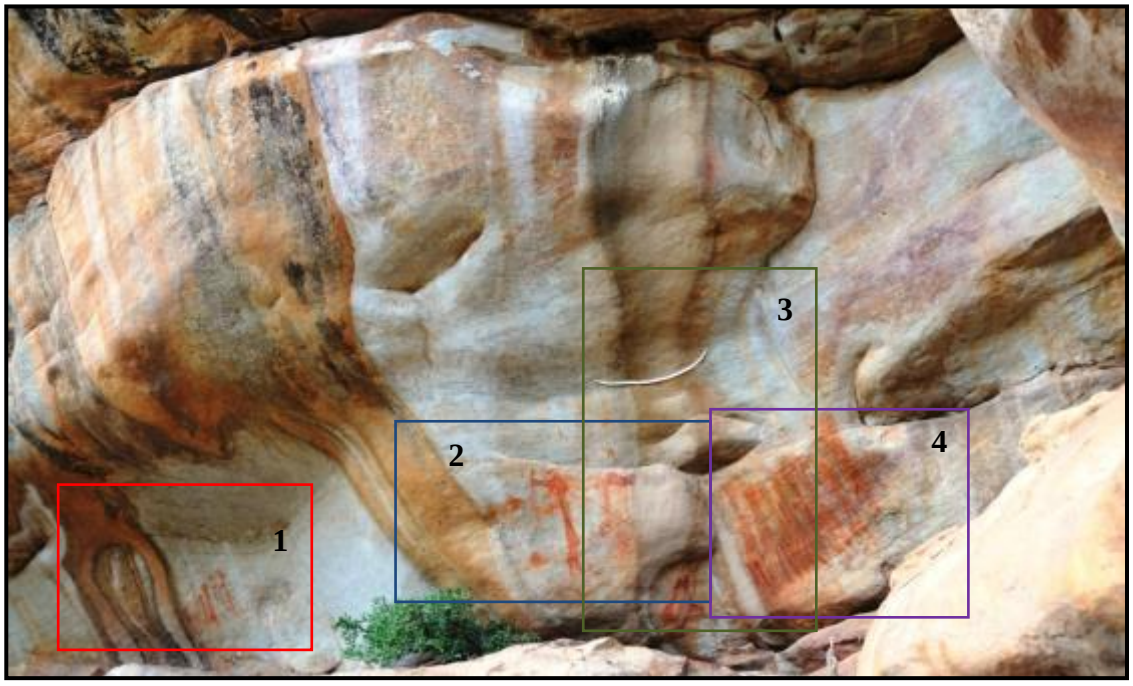



Figure 11a:Wash zones and damp areas in relation to image clusters [Photos by Elijah Katsetse: 2014]

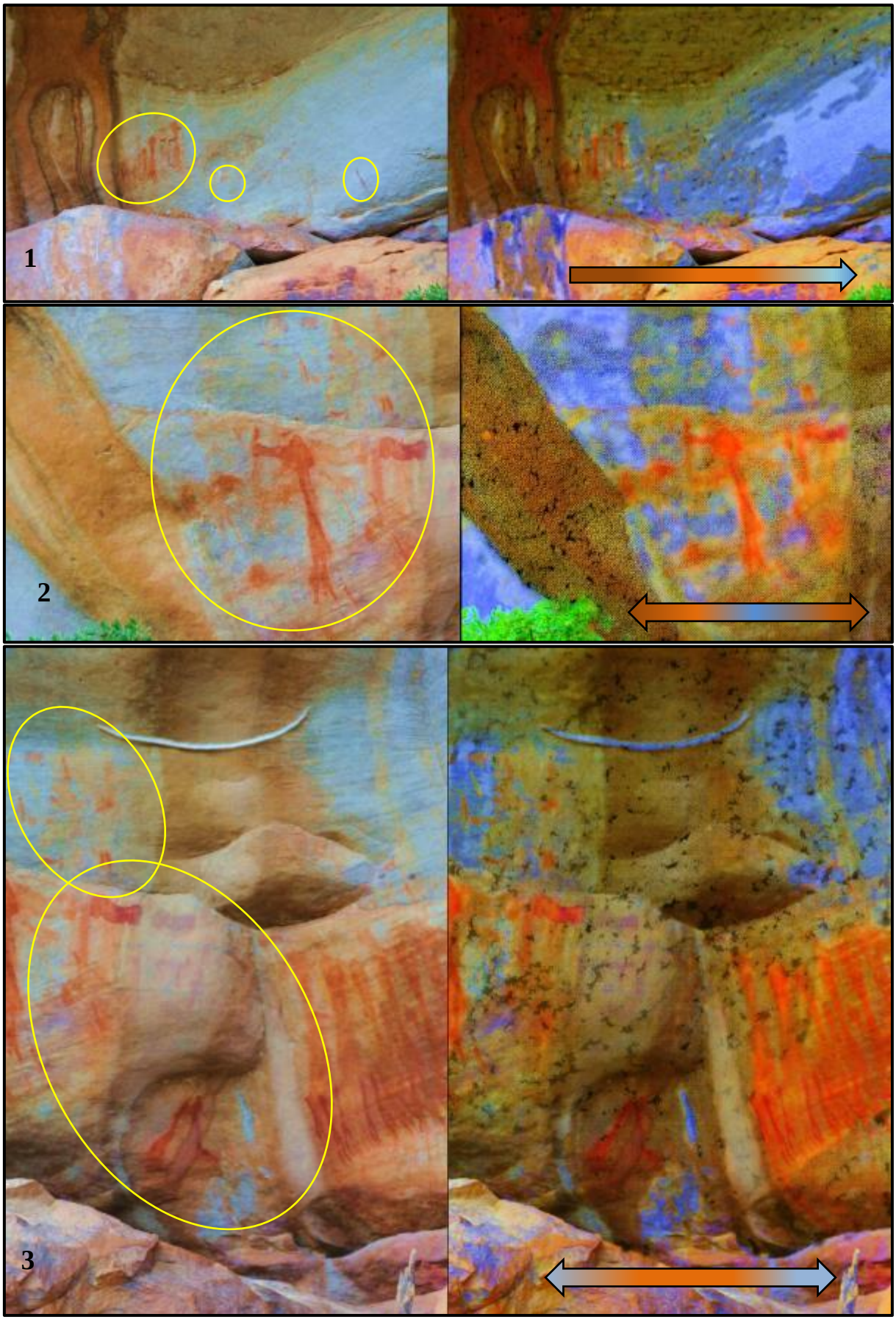



Figure 11b: Wash zones and damp areas in relation to image clusters [Photos by Elijah Katsetse: 2014]

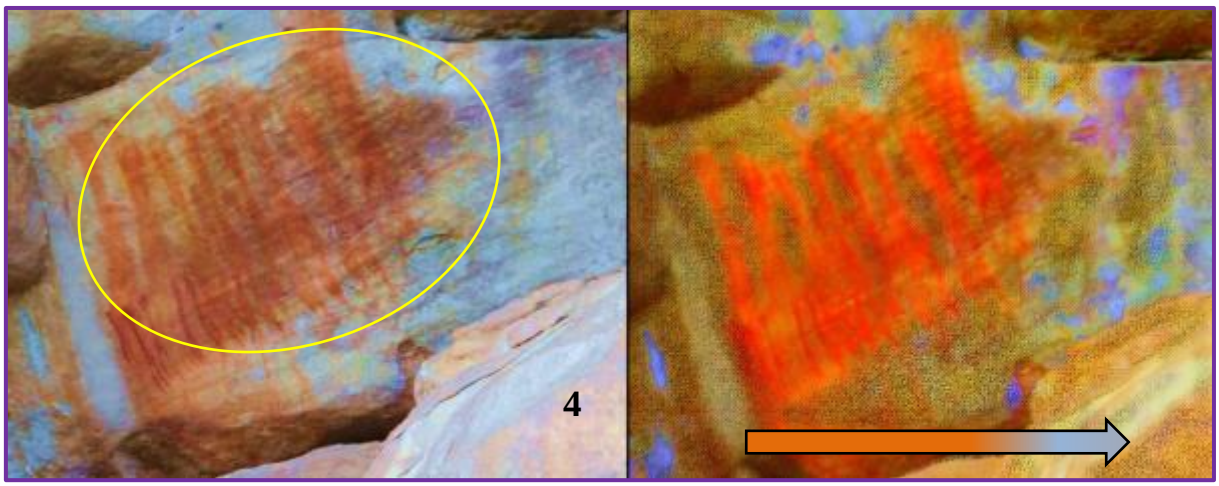



Figure 11c: Wash zones and damp areas in relation to image clusters [Photos by Elijah Katsetse: 2014]

The Figure11a to c show wash zones, damp areas, and mineral dissolution and highlight the degree of water related damage on the rock surface. The degree of water related damage decreases in the direction indicated by the arrow(s). The red circles show image clusters in relation to water damage. The arrow further show a graduated severity of water related damage. Wash zones deposit minerals and salts onto the surface thus staining the images and appears to be causing severe damage to the images. Water flows along the contours of the rock and is often trapped on the surface and gets absorbed into the rock thus creating damp areas. Damp areas also stain the surface over time but this is not severe compared to wash zones.

2. Beersheba Shelter, Mount Currie District, Eastern Cape Province

Conservation Intervention: Installation of a drip line

Installation of a drip line at Beersheba Shelter was carried out as part of the NBRI-NMC project. The project was undertaken for a period 1974–1982. The terms of reference of the project were mainly to focus on the study of deterioration effects on paintings and to develop preservation techniques to ameliorate decay. The project covered the following;

- A survey to study the mechanisms of decay and identify factors causing rock art deterioration;
- Developing preservation techniques and evaluation of these measures;
- Application and monitoring of the interventions.

The images were affected by water seeping from the roof of the shelter, particularly pronounced during periods of sustained rainfall. Seepage was also influenced by the channel above the surface which drained water in the direction of the shelter (Loubser & van Ardt 1979). Installation of a drip line was proposed to ameliorate water damage. A drip line, installed in 1976 by P.J. Loubser and J. van Ardt under the auspices of the Roberts Construction Co. Ltd. was made with epoxy resin 372, masking tape, caulking gun, electric cutter fitted with a carborundum blade, stainless steel strips (type 316), and a drill machine. The drip line was experimentally installed to establish:

- how effectively the flow of surface drainage can be diverted and controlled;
- whether drier conditions can be created in a shelter;
- how practical would it be to install a drip system;
- And the type of equipment required for the work.

Effects of the drip line at the site were immediately observed on two separate occasions. The drip line appeared to be effective because water was successfully diverted away from the images and drier conditions in the shelter were induced. In 1978 the effects of the drip line were again observed. On both occasions the drip

appeared to be effectively diverting water away from the images and maintaining drier conditions in the shelter (Loubser & van Ardt 1979). Loubser & van Ardt (1978) stated that the drip line should be treated as a long term project because the effects of the drip at the site could not be observed at the site in the time they were observed.

The site was not visited during the study due to logistical issues and difficulties locating the site using documented information at RARI and the African Digital Archive. The reason being that in the Orange Free State Province there is a site with a similar name but spelled Bersheba with a single 'e'. It would have been beneficial to the study if the site was visited and casual monitoring of the drip line done. The drip installed at Beersheba is different to the artificial putty drip lines commonly installed in the Cederberg. This would have afforded me an opportunity to evaluate the use of different materials to create artificial drip lines.

3. Mount Grenfell, NWS, Australia

Conservation Intervention: Installation of a drip line

The National Parks and Wildlife Services is charged with the administration and management of Aboriginal relics sought specialists to advise on the rock art preservation from the Australian Museum Conservation Laboratory and the Specialist Services and Applied Research section of the Department of Mines Geological Survey. Acting on advice provided, the National Parks and Wildlife Services set up a project on rock art preservation in 1976 with the following aims;

- to undertake a comprehensive investigation into the causes of deterioration of rock art;
- to initiate field laboratory studies for the development of conservation treatment;
- And to establish practical procedures for the protection of painted and engraved rock surfaces against physical damage from people, animals, and water.

The three rock shelters at Mount Grenfell are relatively low and as such are not exposed to the elements except for a short period during early hours of the morning when sunlight comes into the shelter. The difference in thermal expansion causes exfoliation of the rock surface. However, rock art damage at Mount Grenfell is due to water percolation from the ceiling of the shelter that directly erodes the images. Mineral dissolution of the sandstone causes severe damage by depositing soluble salts and staining the paintings. Installation of a drip line and modification of the shelter's drainage were proposed.

The aims of this intervention were to: reduce significantly the amount of water washing into the shelter and modify the drainage of the shelter. When bituminous caulking compound was used in the installation of the drip line, the following intervention plan was employed for surface modification: (i) plotting the contours of the land overlying and surrounding the shelters; (ii) investigation of the natural catchment drainage and percolation routes in order to analyse precise drainage patterns of the sites and (iii) studying the front elevation of the shelter to produce section drawings. A continuous strip (10 x 7mm) was applied on the contours of the shelter. This strip was designed to withstand temperatures from -4 to 94˚C. The effectiveness of the drip was not observed and no results were reported by Walston and Dolanski (1976).

#### 4.3.2.2. Surface recession and Surface Pollutants

Natural forces causing the destruction of rock art cannot be stopped or ameliorated (Brink 2007). The effects of water on rock substrate and rock art can be treated using both direct and indirect measures of conservation. Preservation measures dealing with water-related damage were discussed in section 4.3.2.1.2. On the other hand direct conservation measures to treat the effects of water on rock art are characterised by the stabilisation and cleaning of rock surfaces. Mineral dissolution can be treated by cleaning the rock surface using chemical agents. Mineral

dissolution of sandstone by oxidation and hydration causes loss of surface cohesion and surface staining (Venter 2011; Bemand *et al.* 2014).

This process results in the leaching of quartz grains in sandstone and clay minerals that provide cementation. A multitude of forces including salt crystallisation and freeze-thaw cycles result in the exfoliation of the surface sand grains. The freeze-thaw cycles may cause the expansion and contraction of the surface sand grains and cementing clay minerals close to the surface of the rock thus inducing the disaggregation of sand grains that may result in the exfoliation, spalling, flaking, and crumbling of the surface. These processes happen close or near the rock surface especially in surfaces exposed to the elements. Therefore, this process causes more rock art deterioration because paintings occur near or on the surface of the rock (Meiklejohn *et al.* 2009).

#### 4.3.2.2.1 Surface consolidation and cleaning systems

Surface consolidation and protective material fall into the broad category of surface coating and include stone protective water repellents, anti-graffiti coatings, emulsions, salt inhibitors, protective oxalate layers, sacrificial lime coatings, colloidal silica, biocides, and bio-deterioration treatments (Price & Doehne 2010; Chelazzi *et al.* 2013). This is arguably the most varied and complex field of treatment materials because in requires chemical investigation and is largely laboratory based. Conservation science deals with damage that results from the crystallisation of soluble salts within stone, attack of acid gases in the air, concentration of white efflorescence on rock surfaces, freeze-thaw cycles and the vandalism of rock art surface consolidation treatment, anti-graffiti coatings and removal treatments. Surface cleaning systems are commonly applied in South Africa to address rock art deterioration.

Surface Consolidation and protective coatings

Conservation science has improved the use and development of surface consolidation, cleaning and protective materials (Chelazzi *et al.* 2013). The involvement of conservation scientists in heritage has resulted in a shift from the use of commercial and traditional consolidation treatment materials to laboratory and tailor-made consolidants (Chelazzi *et al*. 2013). Conservators suggest that a good consolidation treatment agent is one that has a low-viscosity and induces chemical reaction with the substrate *in situ*, is dissolvable in a solvent and has a relatively deep level of penetration (Haskovec 1999; Price & Doehne 2010; Chelazzi *et al.* 2013). Furthermore, the quality of a surface consolidating or protective treatment material is determined by several elements that include the visual quality, ultra-violet stability, surface hardness, depth of penetration, water permeability, and its flexibility (Haskovec 1999; Price & Doehne 2010). A good and effective surface consolidating and protective material, is one that, is mostly liquid at high temperature and hardens at low temperature, is invisible, and is compatible with the substrate (Haskovec 1999).

The compatibility of a consolidating and protective material goes beyond the visual quality of the treatment; it goes to the moisture and temperature regimes of the substrate (Haskovec 1999). The treated surface should have similar temperature and moisture regimes with the untreated stone. Thus, a treatment should not modify the porosity and permeability of the substrate. The compatibility of a consolidating and protective treatment material in this sense will ensure that no internal pressure is created within the rock and the mechanical stress and the subsequent breakdown of the rock is not induced. This can be achieved through a careful consideration of the nature of the material(s) used. Synthetic organic materials have had a negative effect on stone despite their continued use (Chelazzi *et al.* 2013). However, the preparation and precipitation of synthetic inorganic material particularly nano-particles has improved (Chelazzi *et al.* 2013).

Inorganic materials are more effective compared to synthetic organic material (Chelazzi *et al.* 2013). The effectiveness of a surface consolidating and protective material is influenced by several factors, which include the method of application, the physical and chemical characteristics of the agent and the substrate. Conservators thus suggest a step-by-step monitoring of the process of intervention rather than observing the final product of the intervention (Haskovec 1999; Chelazzi *et al.* 2013).

#### 4.3.2.2.2. CASE STUDIES: SECTION 2

4. Bushman Kloof 09, Cederberg, Western Cape

**Box 2: General Site Information**

**Site Name**: Bushmans Kloof 09 **Alternative Name**: Bleeding Nose (BS) Sites

**Site I.D**: BSK 09 **Panel #**: Main Panel **Managing Agency**: HWC

**Date**: 05/July/2014 **Farm Name:** Bushmans Kloof 179

**GPS File**: **S 32° 06' 38.4", E 19° 06' 58.5''** **Photos**: SARADA

**Aspect & Angle**: West Facing **Site Dimensions**: (C: 15 x 2m high x 4-5m long)

**Site Type**: Boulder

**Existing Documentation**: Full record with the Bushmans Kloof Reserve

**Samples**: No

Site Description and Material Characterisation

BSK09 are comprised of three sites situated on the eastern bank of the Perdekraal River upstream, about 2 kilometres from the main reservoir. The site complex is 15 meters long along the edges of the river, occasionally flooded in winter. The small west facing boulder where conservation experiments were undertaken is the focus of this study.

The small protective boulder is situated in the middle of a brush of vegetation on the river bank (Fig. 12). The vegetation around the site includes the *Podocarpus eongetus, Mytenus oleoides, Heeria argentea, Rhus undulata, Rhus dissecta* and on deeper soil above on the flat area, *Tycedon paniculatus, Cotyledon orbiculata*, and some *Restionaceous* reeds. The vegetation does not provide any form of protection to the images nor does it pose any threat.

The images are executed on the Table Mountain Sandstone. The images were painted using dark red and brown pigments. Shades of white and yellow can be observed within the BSK 09 complex. The condition of the paintings ranges from well to poorly preserved images. Some of the images have faded and it is difficult to make them out. The images depict various subject matter including human figures, animals, and therianthropes.

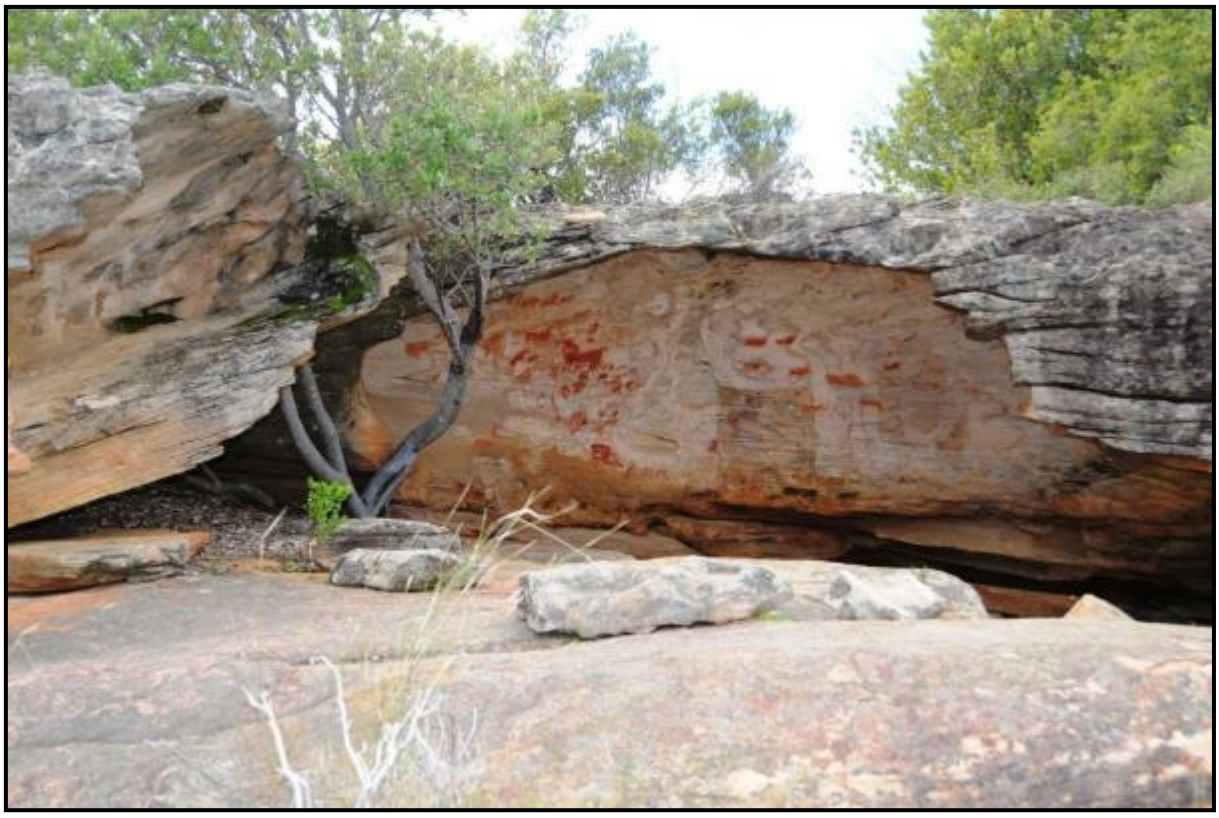


Figure 12: View of boulder BSK 09, Cederberg [Photo by Elijah Katsetse: 2014]

Conservation Condition Assessment

The small protective boulder of the BN sites complex is affected by natural and anthropogenic factors of decay. Wind abrasion appears to be causing damage to the site and images. There are signs of etching and pitting on the surface. There are signs of exfoliation and spalling at the site. Thermal expansion and moisture variation appears to be causing physical weathering of the boulder. The wind also deposits dust on the surface of the rock.

Exposure of paintings to the elements subjects images to biological attack from lichen and algae. There are signs of mud wasps on the roof of the overhang some of which are directly on top of images. Painted graffiti is also present at the site. Letters 'JM' can clearly be seen on rock face. Moisture and temperature variations causedamage to the images and induce the loss of surface cohesion (Fig. 12). To

tackle these problems an experiment with protective surface coatings was undertaken at the site (Mguni 2007).

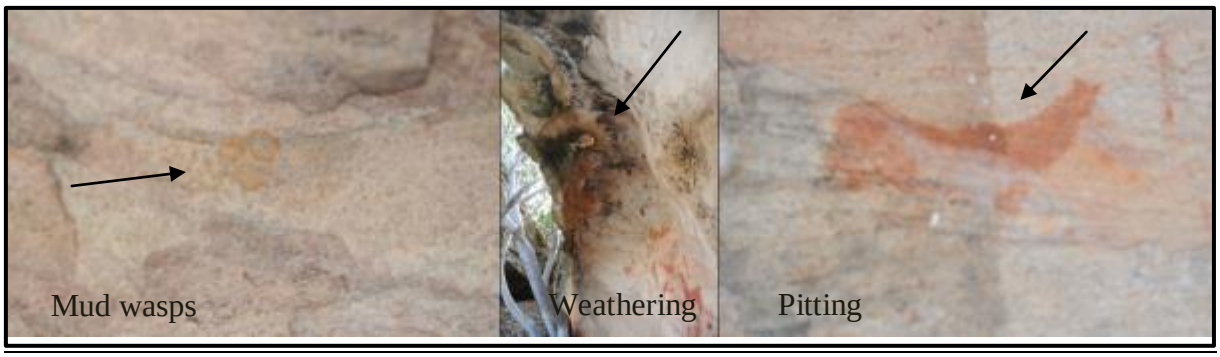



Figure 13: Factors causing deterioration at BKS 09, Cederberg [Photos by Elijah Katsetse: 2014]

Past Intervention(s)/Treatment(s)

BN was used to perform an experimental intervention with surface protective material (Fig. 14). The intervention is observable on site and was recorded in the NBRI reports and in the management plan of the reserve. Varnish was probably used to coat the surface of the boulder where images occur. This intervention could have been done to deter surface recession and/or to consolidate the rock surface. The surface where the coating was applied appears to be intact and as such the intervention could have been successful in consolidating the surface. There is no information that entails the documentation of the intervention and its subsequent monitoring.

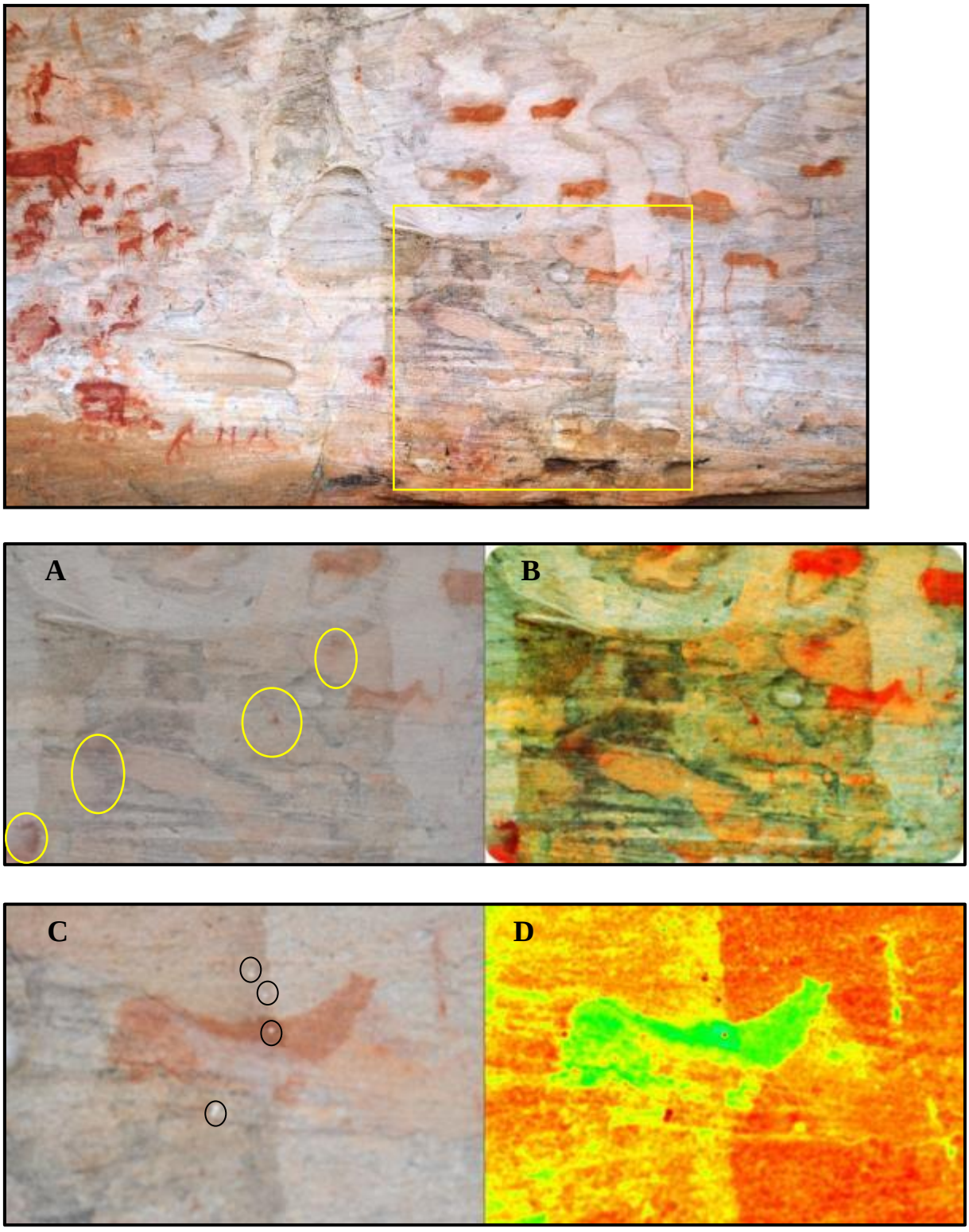



Figure 14: 'Varnish application on a rock art surface at BKS 09, Cederberg [Photos by Elijah Katsetse: 2014]

Figure 14 shows pigment layers highlighted in yellow circles (**A**) below the vanish layer. Pigment layers can clearly be seen on an enhanced image (**B**). Black circles (**C**) show areas of surface pitting near and over a painting. Surface pitting causes loss of pigment and/or patina thus creating scars. Surface scars appear in a reddish colour in the heat map image; This is an indication that pitting has totally removed both the pigment and varnish to expose the rock surface The heat map (**D**) suggests that the varnish layer allows the rock to breath freely because the heat index of the antelope appears even below and outside the treated area.

Surface Cleaning

Cleaning surface pollutants and/or dirt employs the same conservation protocol as the consolidation and protective treatment of surfaces (Haskovec 1999; Chelazzi *et al*. 2013). Characterisation of the nature of the dirt and the rock substrate is important in developing an appropriate cleaning treatment. The physical and chemical properties of both the cleaning agent and the substrate are important in relation to the environment in which they are immersed. Cleaning treatments employ the use of both mechanical and chemical cleaning materials. Traditional cleaning methods are mostly mechanical, (e.g. brushes, bamboo sticks and sandblasting) (Dandridge 2000). Chemical cleaning of cultural stone employs a variety of techniques to deacidify and desalinate surfaces. Modern chemical cleaning methods are founded on the strategic release of active agents. These methods range from micellar solutions, micro-emulsions, synthetic polymers (gels and responsive gels), poultices, to ion exchange mechanisms (Price & Doehne 2010; Martínez-Arkarazo *et al.* 2010; Chelazzi *et al.* 2013).

### 4.3.2.2.3. CASE STUDIES: SECTION 3

5. Bonne Esperance 16, Makgabeng, Limpopo Province

**Box 3: General Site Information**

**Site Name**: Bonne Esperance 16 **Alternative Name**: 'The Great Train Site'

**Site I.D**: BOE16

**Panel #**: Main Panel **Managing Agency**: Limpopo Heritage Resources Agency (LHRA)

**Date**: 05/July/2014 **Farm Name:** Bonne Esperance

**GPS File**: **S** 23° 16' .02", **E** 28° 51' .02" **Photos**: SARADA

**Aspect & Angle**: South Facing **Site Dimensions**:

**Site Type**: Rock shelter

**Existing Documentation**: Full record filed with RARI **Samples**: No

Site Description and Characterisation

BOE16 is a large concave shelter carved into Sandstone of the Makgabeng Formation. The angle of the overhang is acute thus protecting the images from water seepage above the shelter. The site is located upslope on the rock face of a krantz. The site is well hidden behind a thicket of vegetation. The vegetation in front of the shelter provides protection against direct rainfall, wind erosion and livestock. The main panel of the site extends from the centre in both directions toward the eastern and western end of the shelter. The subject-matter includes, rail tracks, trains, people and animals painted in a range of white pigments. There is a San giraffe in white below these Northern Sotho images and more San images of sheep painted in black to the eastern end of the shelter.

Conservation Condition Assessment

The site is affected by natural processes of deterioration (Fig 15). Prior to an intervention by RARI, livestock used the site for shelter to rest and roll in the dust to clean their coats. This resulted in increased levels of dust. There is evident exfoliation and granulation probably influenced by the presence of both soluble and insoluble salts. However, an imminent threat is presented by both birds and bats excreta.

The structure of the shelter subjects the main panel to the effects of bird droppings because the back of the shelter protrudes. Ledges above the protruding back wall provide nesting and roosting shelters for birds and bats. The main panel is heavily covered with bird droppings accumulated over years into a thick deposit that not only is unsightly but weathers both the paintings and the rock. Evaporation of the bird droppings may result in salt concentration on the rock surface and the transportation of soluble salts that could further cause damage to the images. RARI called in an expert conservator to address the bird and bat problem at the site. Assessment of the problem prior to the intervention using dated images shows that the droppings may have been accumulating since 1999.

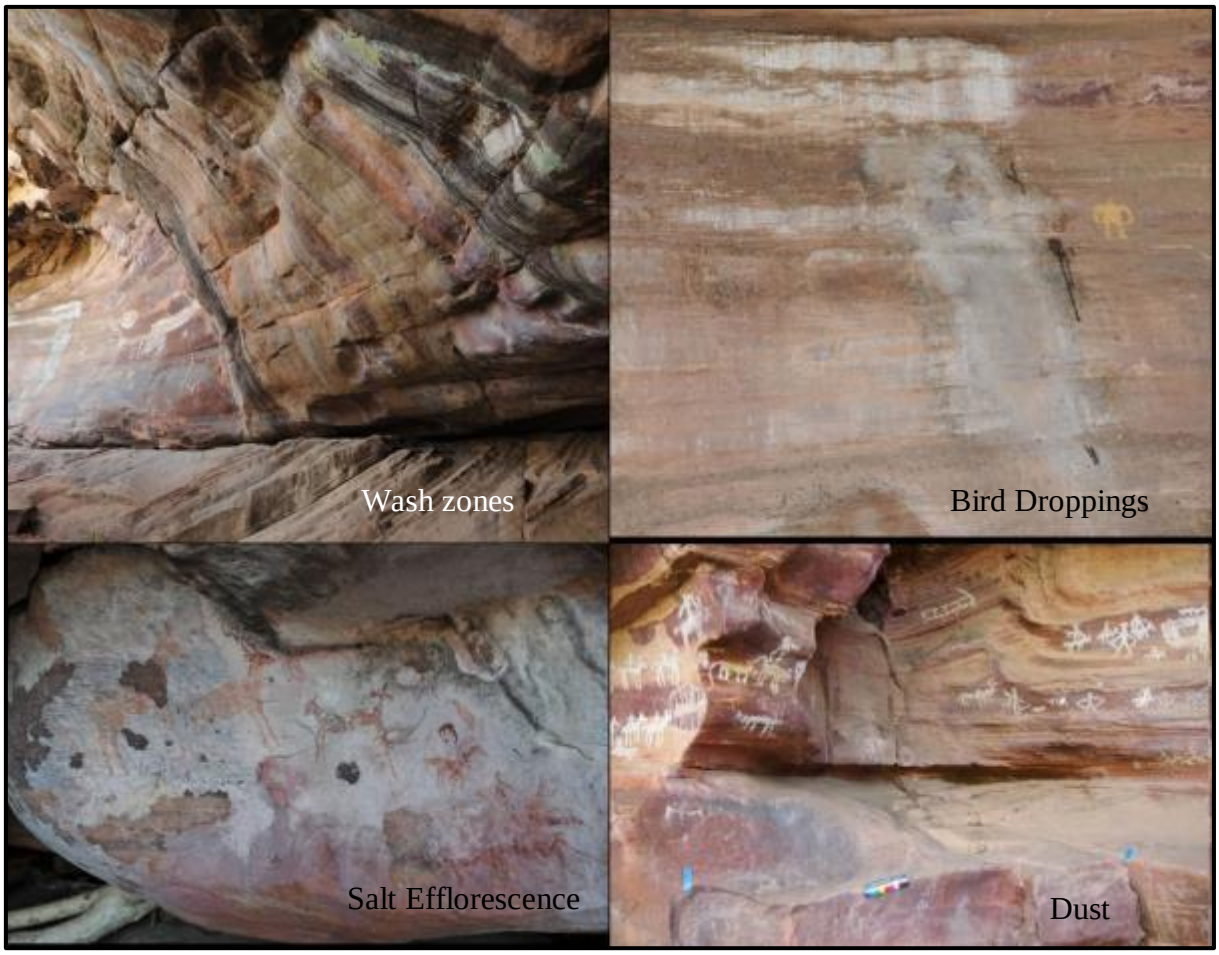



Figure 15: Factors causing deterioration at BOE 16, Makgabeng [Photos by Elijah Katsetse: 2013]

Past Intervention(s)/Treatment(s)

An intervention to remove bird and bat droppings was undertaken in 2013. This intervention was done by Claire Dean of Dean and Associates and a team from RARI. This intervention was part of the Four Rock Art sites conservation project funded by the US' Ambassador for Culture Preservation. The intervention was undertaken using cotton tipped swabs, cotton wool, pink pearl erasers made by Paper Mate, mars plastic erasers made by Steadler, tap water, various soft, hair-bristle artist's brushes, household cleaning cloth, sticks and bamboo skewers, soft tooth brushes, *Vamoose Bird Repellent Gel and Sealer*, Triton X100 non-ionic detergent . The aim(s) of this intervention were to:

- Reduce and wherever possible remove bird droppings from the main panel.
- Reduce and wherever possible remove accumulation of bat droppings.
- To install some means to deter birds from roosting on the ledges within the site and thus reduce the further accumulation of droppings.

A pigment solubility test was done prior to the intervention. A condition assessment and treatment record are archived at RARI. The treatment record includes before and after treatment images (Fig 16a-c). This indicates good practice and these data can be used in future conservation and monitoring work. A step-by-step monitoring of the treatment process was done during the intervention. Observations were also done at the end of the intervention process to observe the immediate results and effectiveness of the cleaning agent(s). Both monitoring activities were done by Claire Dean. The cleaning system was effective (Dean 2013). As a result a significant quantity of the bird and bat droppings had been either totally removed or reduced to a residue. The effectiveness and results of this treatment resulted in an 85% improvement both in terms of removal and the visual quality of the main panel (Dean 2013).

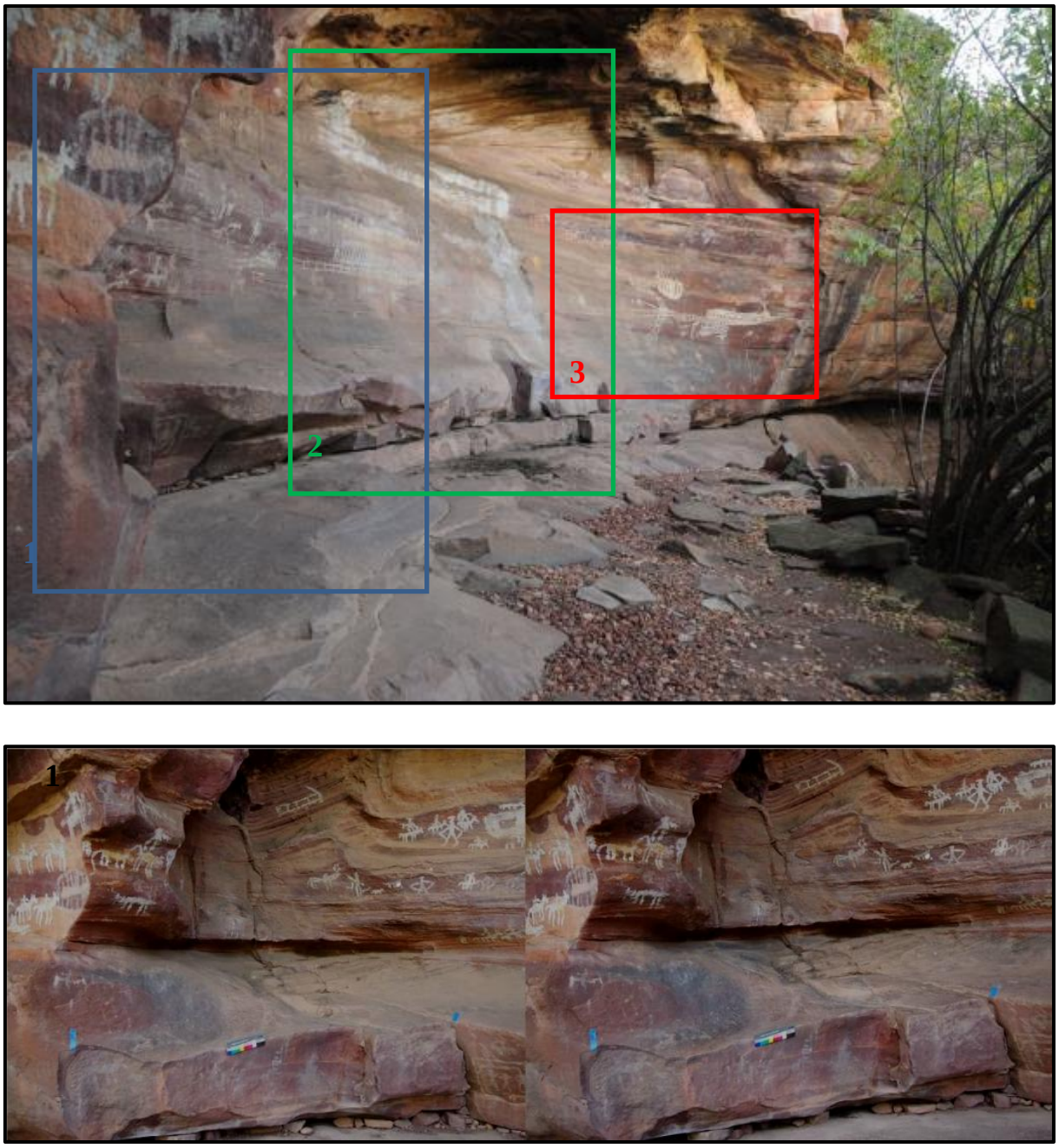






Figure 16a: Treatment record for BOE 16, Makgabeng [Photos by Claire Dean: 2012]

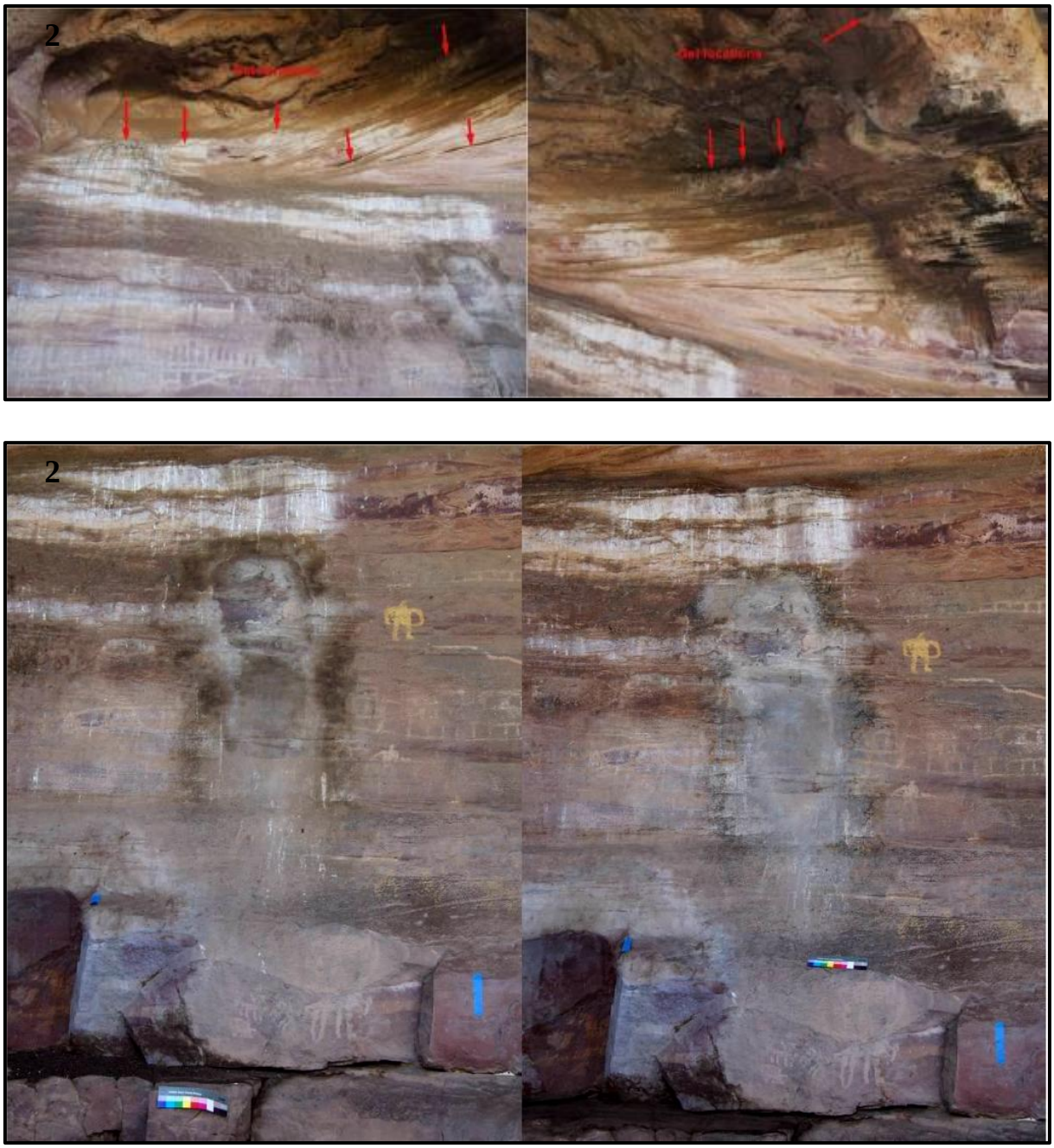



Figure 16b: Treatment record for BOE 16, Makgabeng [Photos by Claire Dean: 2012]

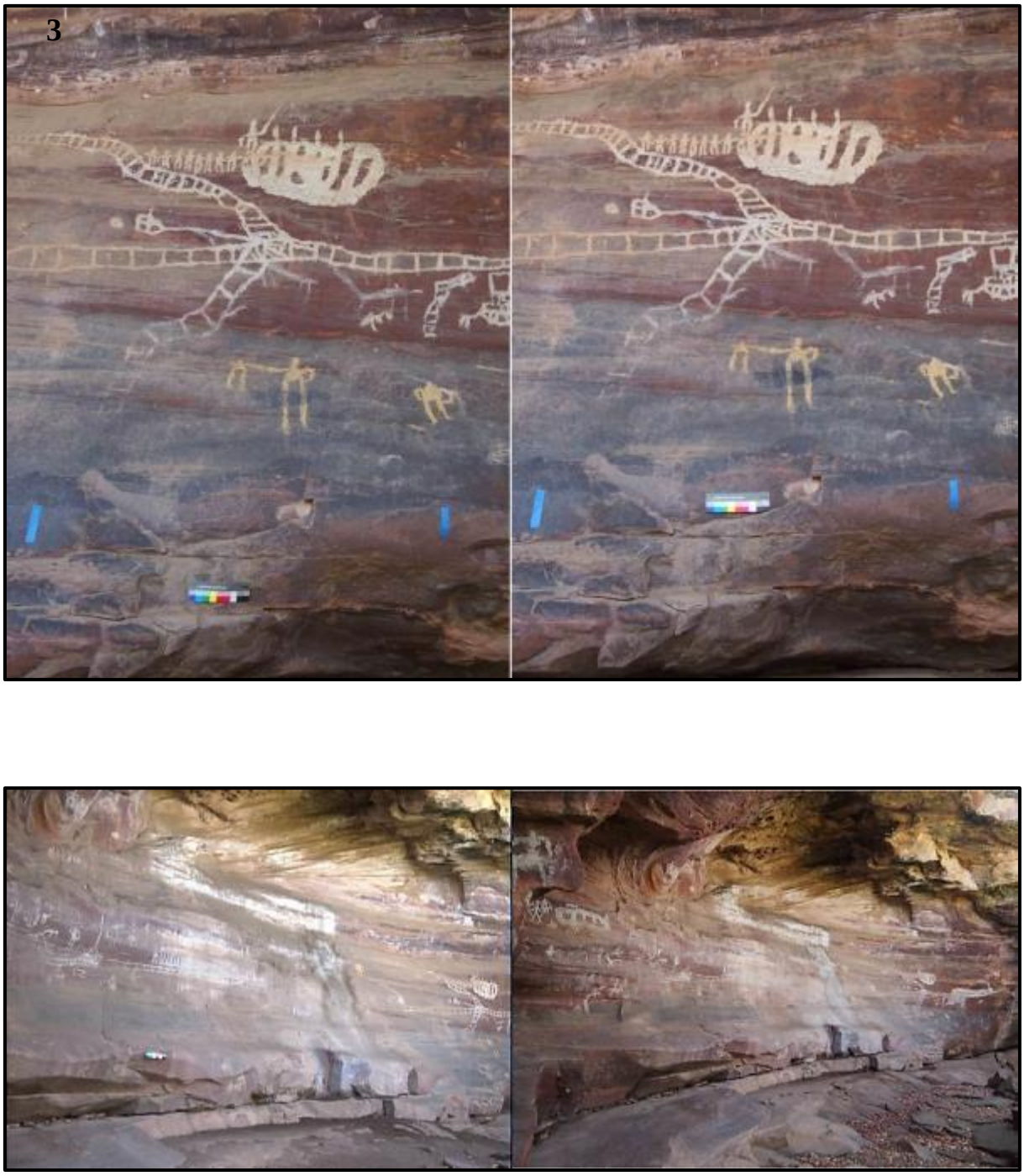
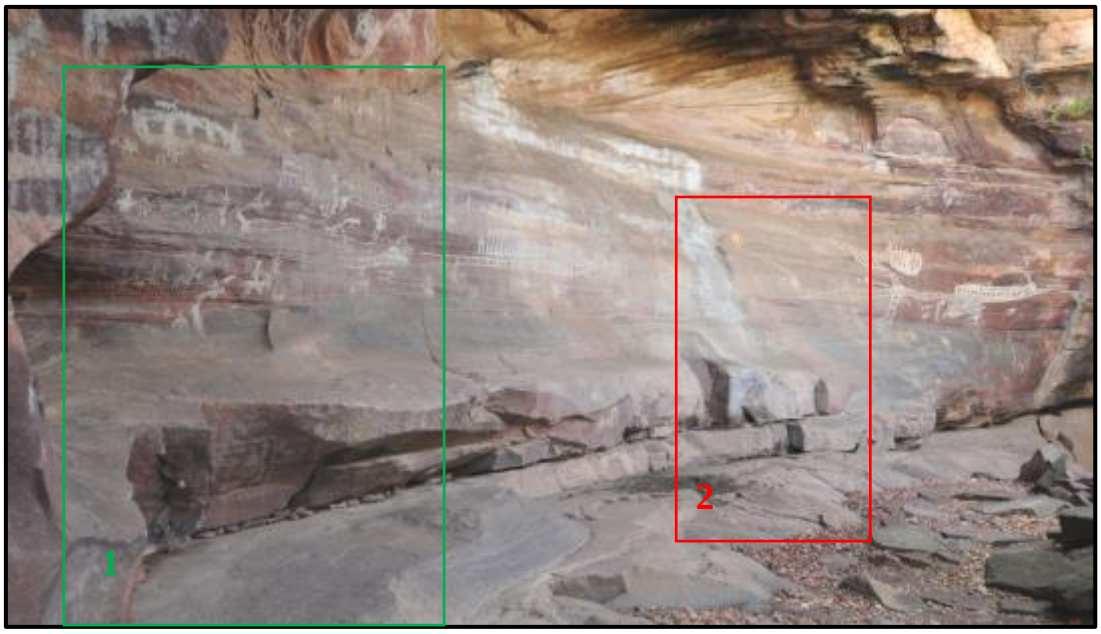



Figure 16c: Treatment record for BOE 16, Makgabeng [Photos by Claire Dean: 2012]

Figure 16 a-c is a Treatment (before and after) record of the intervention at BOE16. Each area highlighted in the photographs represents the treatment of different factors of decay; treatment area(s) 1 and 3 in Fig. 16a show the removal of dust and 2 bird dropping and the application of a gel to deter birds and bats from roosting, while 4 is the general view of BOE16 before and after treatment. Before images are on the left and after treatment images are on the right.

In 2013 when I visited the site the droppings had re-emerged (Fig. 17). The problems of bird droppings and roosting persisted at the site because the *Vamoose Bird Repellent Gel and Seal* as well as the small stones put on the ledges to deter the birds and bats from inhabiting the site were not effective. Therefore, the birds and bats continue to inhabit the ledges above the main panel and deposit guano. Dust was successfully removed from the surfaces of the shelter and new information that was previously obscured was revealed.

Furthermore, an indirect intervention to minimise dust at the site was undertaken by RARI staff (Benjamin Smith, Catherine Namono and Siyakha Mguni). Small pebbled stones were collected from areas surrounding the site and carefully laid on the floor of the shelter. This intervention contained and reduced the dust to a minimum; it improved the floor of the site significantly, as well as the site visual appeal since the materials used are compatible with the site surroundings. This intervention was monitored a year later in 2014 and the results are good.


1
2


1


2




Figure 17: Treatment monitoring at BOE 16, Makgabeng [Photos by Claire Dean: 2012 &Elijah Katsetse: 2013]

The conservation monitoring at BOE16 has had mixed results. The series of images 1−3 show the effectiveness and failures of the intervention at BOE16. The gel application on ledges has not been successful in deterring birds and bats from roosting at the site thus the problem is persisting. On the positive side, dust levels have been kept to a minimum. The original treatment record images are on the left and monitoring images are on the right.

6. Main Caves (North & South), Drakensberg, KwaZulu-Natal

**Box 4: General Site Information**

**Site Name**: Main Cavesnorth **Site I.D**: MSI1**Panel #**: Main Panel

**Date**: 05/July/2014

**Managing Agency**: Amafa **Farm Name:** Giant's Castle

**GPS File**: **S** 29° 16' 55", **E** 29° 30' 55" **Photos**: SARADA

**Site Type**: Rock shelter **Aspect & Angle**: North Facing

**Site Dimensions**: Record with RARI **Samples**: No

**Existing Documentation**: Full site record filed with the RARI

**Box 4: General Site Information**

**Site Name**: Main Caves southeast **Site I.D**: MSI1 **Panel #**: Main Panel

**Date**: 05/July/2014

**Managing Agency**: Amafa **Farm Name:** Giant's Castle

**GPS File**: **S 29° 16' 55", E 29° 30' 55"** **Photos**: SARADA **Site Type**: Rock shelter

**Aspect & Angle**: Southeast Facing **Site Dimensions**: Record with RARI
**Samples**: No
**Existing Documentation**: Full site record with the RARI

Site Description and Characterisation

The Main Caves Site Museums are found along a trail about two kilometres from the Giant's Castle Guest Lodge (rest camp). The famous rock '75' is found along

this trail. Main Caves are situated upslope on a krantz line looking down the Two Dassie River. Main Caves north is located on the southern bank of the Bushman's valley. Main Caves north is a rock shelter hidden behind a thicket of trees and shrubs. The floor leading up to the shelter is covered with soil and large boulders and slopes up and down towards the front, eventually falling off steeply to the valley below. A boardwalk was installed on site to allow visitors access into the site and to provide a good viewing platform. The site has one of the best quality and complex rock art imagery scenes in the Drakensberg.

The Images are depicted on sandstone of the Clarens Formation. The subject matter includes animals, therianthropes and human figures. Images of therianthropes on the main panel are synonymous with the site. There is also a series of panels depicting snakes which are particularly elaborate compared to paintings of snake seen elsewhere in South Africa. The preservation quality of the images ranges from good to poor. Images painted in white in particular appear faint compared to images in red.

Conservation Condition Assessment

Main Caves has been fenced off since the late 1960s and this has helped limit the vandalism of the site. Graffiti identified at the site appears to date to the late 1900s. Letters Jack Hobbs can be seen on the roof of the shelter. A big tree that was removed when the boardwalk was installed was used as a ladder to reach the roof of the shelter. The removal of vegetation in front of the shelter may have exacerbated the deterioration of rock art. The exposure of rock art to the elements may have increased the weathering of both the sandstone and paintings.

The Main Caves sites have been focus areas for weathering studies since 1990. These studies show that images are executed on actively decaying sandstone. Weathering processes pose a major threat to the long-term preservation of images. Salt efflorescence, wind abrasion, dust, and exfoliation appear to be major threat at the site(Fig. 18). Ward & Maggs (1995) singled out the effects of exfoliation as the

major factor with detrimental effects on the images. Furthermore, the rate of exfoliation may have increased in the last 20 years.




Figure 18: Factors causing deterioration at Main Caves, Drakensberg [Photos by Elijah Katsetse: 2013]

The exposure of images to the elements subjects images to microbiological attack from algae, lichens and fungus. However, these appear not to be posing any immediate danger. Bird and dassie excreta can also be identified but appear not to be causing damage to images. The presence of birds and dassie excreta on the floor of the shelter and on some of the rock faces where images are found may appear unsightly to visitors. Although a substantial amount of vegetation was removed in the past, vegetation that remains poses a fire hazard. Coupled with the wooden floor ofthe site fire may cause serious damaged to the site. The installation of the boardwalk appears to have further limited visitor wear at the site.

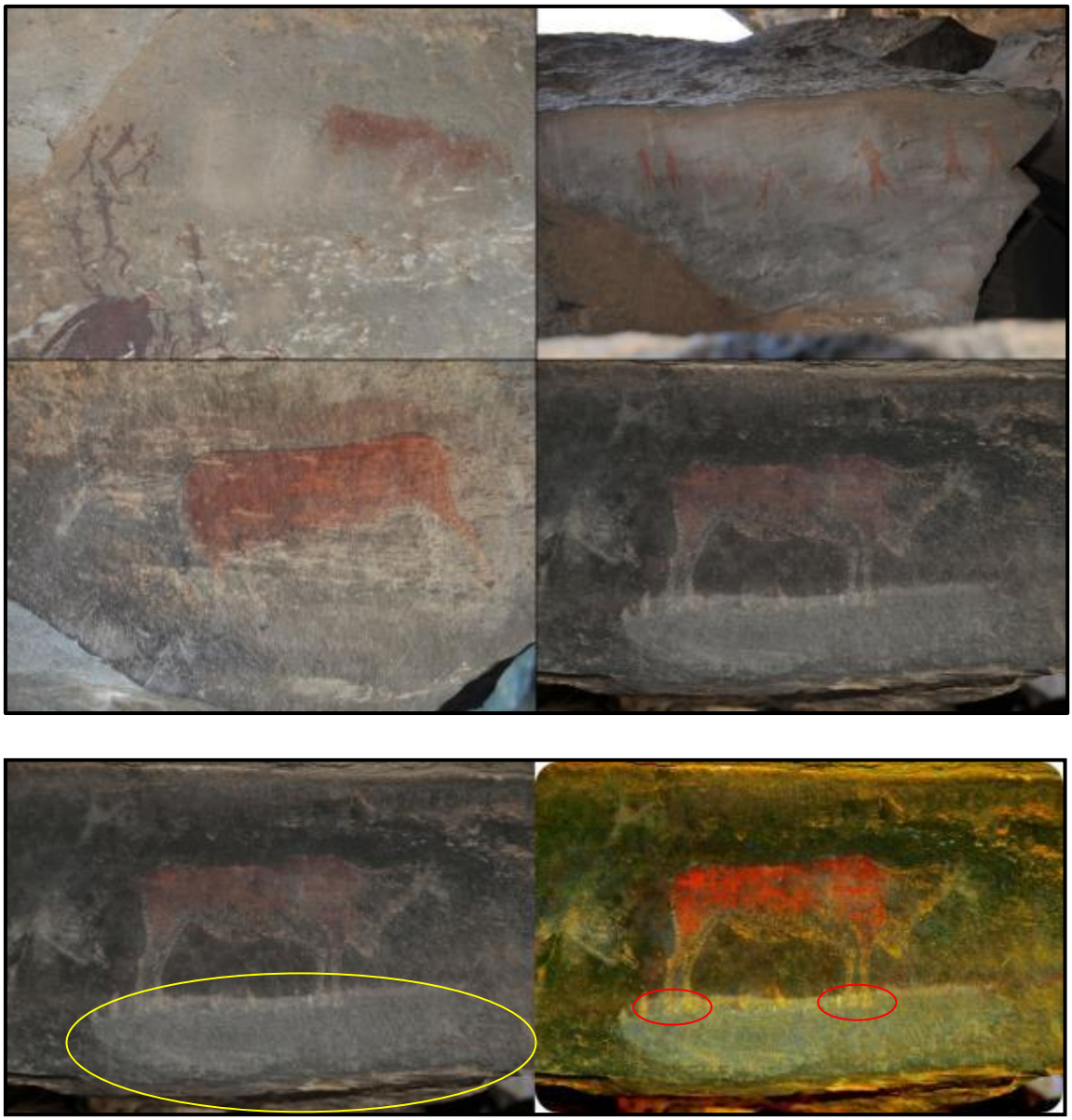


Figure 19: Damage due to an intervention at Main Caves, Drakensberg [Photos by Elijah Katsetse: 2014]

Vandalism of the site in recent times caused on the one hand by carelessness and ill-considered actions of Amafa and conservation enthusiasts (Fig. 19). Attempts to remove graffiti at the sites have resulted in the scratching of rock surface and to certain extent damage has been caused to images. In general, the site appears to be in a good state of preservation and it is well protected.

Past Interventions(s)/Treatments

An intervention to remove graffiti at the site was undertaken in the past but no record of it was found during this study. Instead the effects of this intervention can be seen on the rock surface and on images. However, no information pertaining to this intervention exists. It is not clear when and by whom this intervention was undertaken. However, the aim(s) of the intervention may have been;

- to probably mask/hide the negative effects of graffiti
- to discourage further vandalism of the site

The attempt to remove graffiti had detrimental effects on the site. It has left scratches that are unsightly on the rock surface (Fig. 18). The intervention, probably done by an unsupervised, inexperienced individual is detrimental to the site. Although the intentions may have been founded on good intentions the results are negative. In 1967 and 1998 Main Caves site museums were developed for public visitation .The following modification and additions were done, paved paths, fence, Bushman Diorama, Display signs, and a boardwalk (Fig. 20). These interventions were undertaken under the auspices of the Natal Parks Board (now Ezemvelo KwaZulu-Natal Wildlife) and Amafa. The Natal Parks Board and Amafa wanted to:

- Control access to the site.
- Control visitor movement on site
- Reduce vandalism and damage of the site.
- Allow access to the knowledgeable and appreciative.
- Educate the public about rock art and its significance.
- Better presentation of the site.

No documentation (Condition assessment or treatment record) of the intervention was found during and prior to field work. However, information on the development of the site is available in published material. Amafa does periodic monitoring of rock art sites but the scope of monitoring is not known. Amafa uses a card system to monitor rock art sites. It has not methodology to monitor conservation interventions. The vandalism of the site has been successfully kept to

a minimal. No recent graffiti and camping activities have been identified in some time. The development of the site for public visitation, it can be argued though good intentioned, may have caused/enhanced the effects of deterioration factors on images. Public visitation the Drakensberg have failed to deliver on the high expectations the rock art community had of the sites (Duval & Smith 2013).

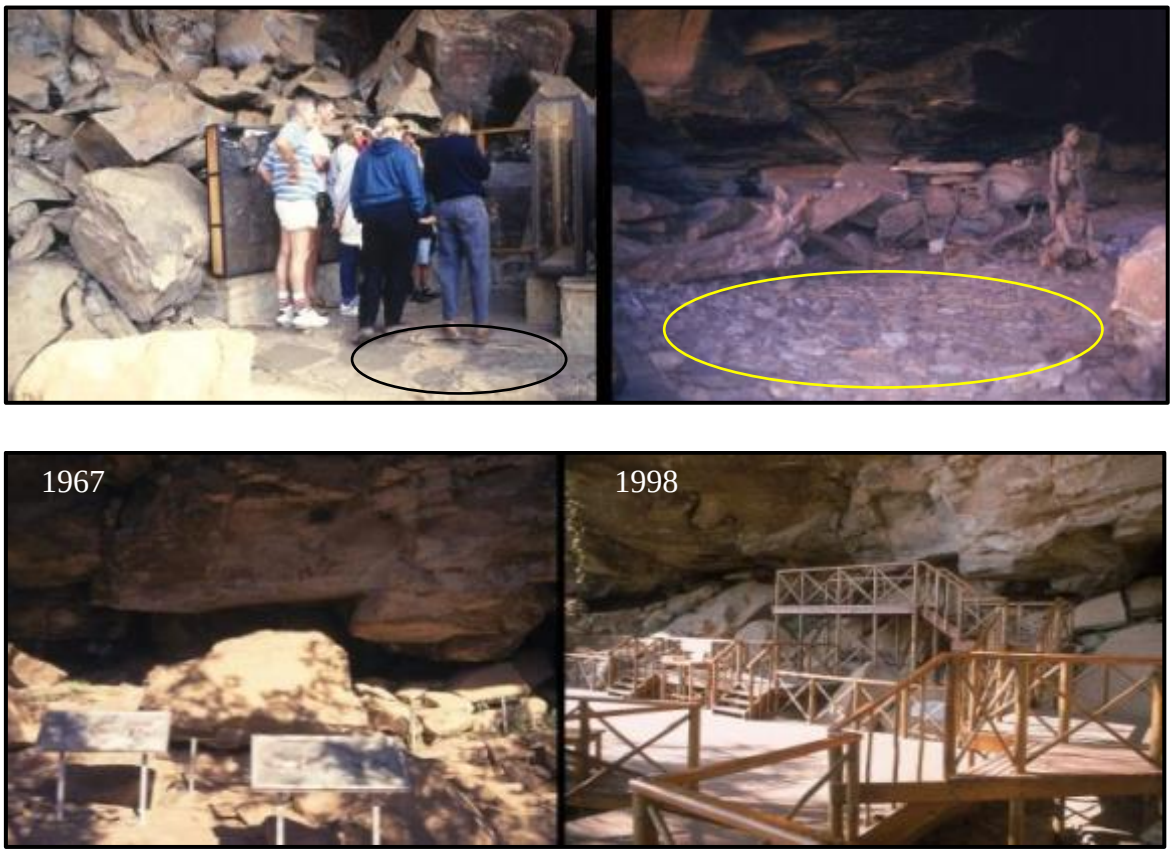



Figure 20: Visitor and dust control interventions at Main Caves, Drakensberg [Photos from SARADA]

The presence of bird and guano at Main Caves was noted by Ward (1994) and Maggs and Ward (1997). In 2013 Claire Dean a conservation specialist, was brought to remove bird droppings and dust. The Intervention was undertaken by Claire Dean in collaboration with a team from RARI and was undertaken under permit: Rock Art 2013/002. This intervention was undertaken under the four rock art sites conservation project. The following materials were used: polythene sheeting; blue, low tack painters tape (3m brand), cotton tipped swabs, cotton wool,

water, household cleaning cloths, sticks and bamboo skewers, soft tooth brushes, locally gathered stones. The aim of the intervention was to:

- Reduce and wherever possible remove bird droppings from the locations where they have accumulated near to rock image panels. Other accumulations at distance from any panels were not scheduled to be treated.
- Where necessary and possible, remove/reduce any isolated droppings that have been deposited on panels.
- Install some means to deter birds from roosting on the ledges within the site and thus reduce the further accumulation of droppings.

A solubility test was done prior to the intervention. A condition assessment and treatment record are archived at RARI. The treatment record includes before and after treatment images (Fig. 21 and 22). This will be useful in future conservation and monitoring work. The effectiveness of treatment was monitored during the course of the intervention and at the end of the intervention process. Results presented here are based on observations made by Dean (2013). "On completion of treatment a significant amount of the bird droppings in the areas treated had been either totally removed or reduced to a residue. As a percentage it is estimated that a 95% improvement of the areas treated was obtained" (Dean 2013: 17). A large accumulation of bird droppings was removed successfully and the visual quality of the site improved substantially.

The accumulation of bird droppings on the rock surface posed no threat to the images and as such their removal is described as a cosmetic action by Dean (2013). In certain areas the accumulation of bird guano appears to have etched the rock surface and left a white residue. It should be kept in mind that the cleaning of bird droppings was to maintain a uniform visual quality of the site. To allow for a certain level of compatibility the removal of dust and bird guano had to blend in with the surrounding site condition.




Figure 21: Treatment record for Main Caves southeast, Drakensberg [Photos by Claire Dean: 2013]



Figure 22: Treatment record for Main Caves north, Drakensberg [Photos by Claire Dean: 2013]

7. Game Pass Shelter, Drakensberg, KwaZulu-Natal

**Box 1: General Site Information**

**Site Name**: Game Pass Shelter **Site I.D**: **Panel #**: Main Panel **Date**: 11 May 2013

**Alternative Name:** Rosetta Stone **Managing Agency**: Amafa

**Farm Name:** Kamberg Nature Reserve **Site Type**: Rock shelter

**GPS File**: **S29° 23' 38.6", E 29° 28' 42.8"Photos**: SARADA

**Aspect & Angle**: Northeast Facing **Site Dimensions**: Record with RARI

**Samples**: No **Existing Documentation**: Full site record with RARI

Site Description and Characterization

Game Pass Shelter is located about one kilometre from the main camp and the Kamberg Rock Art Centre. The site is situated upslope on the cliff of a mountain forming part of the escarpment. Game Pass Shelter is a wide and long shelter with imposing size. The shelter is exposed to elements with no form of protection against incoming sunlight and direct rainfall. The elevation of the shelter at 2040m above sea level gives it enough elevation to provide a good view of the Kamberg Nature Reserve. The images in the shelter can be seen from a distance.

The shelter has some of the best quality images in the Drakensberg. The famous 'Rosetta Stone' motif used to crack the code of the religious context of paintings in San mythology and Cosmology is found here. The scene depicting an eland in a dying posture called the Rosetta Stone is synonymous with the site. Subject matter includes animals, people, and therianthropes. An estimated 350 motifs can be

identified at the site. Game Pass Shelter is arguably one of the most culturally and spiritually significant sites in the UDP (discussed in chapter one).

The site has been a focus of weathering studies since the early since 2000s (Hoerlé 2005, 2006). The monitoring of environmental conditions at this site is believed to have significant implications for the preservation of the site. A host of natural weathering processes affect the preservation of the images.

Conservation Condition Assessment

Physical damage at the site is caused by people, animals, and natural weathering processes. Weathering processes cause major damage. Exposure of the site to elements subjects the images to direct solar radiation and rainfall. The difference in thermal expansion causes exfoliation, flaking and spalling of the surface and images. Wind erosion causes the etching and pitting of the rock surface. Meteoric water also causes damage to the site by depositing organic minerals on the rock surfaces.

Exposure to elements further subjects the site to damage by animals and people. Dassie and bird excreta can be identified on the surfaces and sometimes over images. Damp areas at the site also promote the growth of micro-organisms such as lichens at lower levels of the rock surface. Lichens cover the lower level of the site and do not appear to be posing any immediate threat to the images. Human induced impact can also be observed at the site in the form of Graffiti (Fig. 23). The issue of graffiti at Game Pass Shelter appears to be persistent and serious management interventions are required.




Figure 23: Various graffiti at Game Pass Shelter, Drakensberg [Photos by Elijah Katsetse: 2013]

Past Intervention(s)/Treatment(s)

In 2001an intervention was undertaken at Game Pass Shelter by RARI staff, Janette Deacon and conservator Claire Dean. The intervention was undertaken to address the impact of graffiti at the site by using anti-graffiti coatings. The aim(s) of the intervention were probably;

- To mask/hide the negative effects of graffiti
- To discourage further vandalism of the site

The effects of graffiti at the site were masked successfully. The effects of graffiti on the rock face were either completely coated or masked to a relative compatibility with the surface (Fig. 24a-b). The effectiveness of the treatment could also be attributed to the compatibility of the treatment with surface because it blended well and was not visible to the naked eye. The conservator recommended that the

treatment be regularly monitored because the graffiti could reappear. The treatment was regularly monitored by both RARI and Amafa on several occasions. The treatment lasted for a certain period before the graffiti reappeared. Another intervention to retreat the graffiti was undertaken.

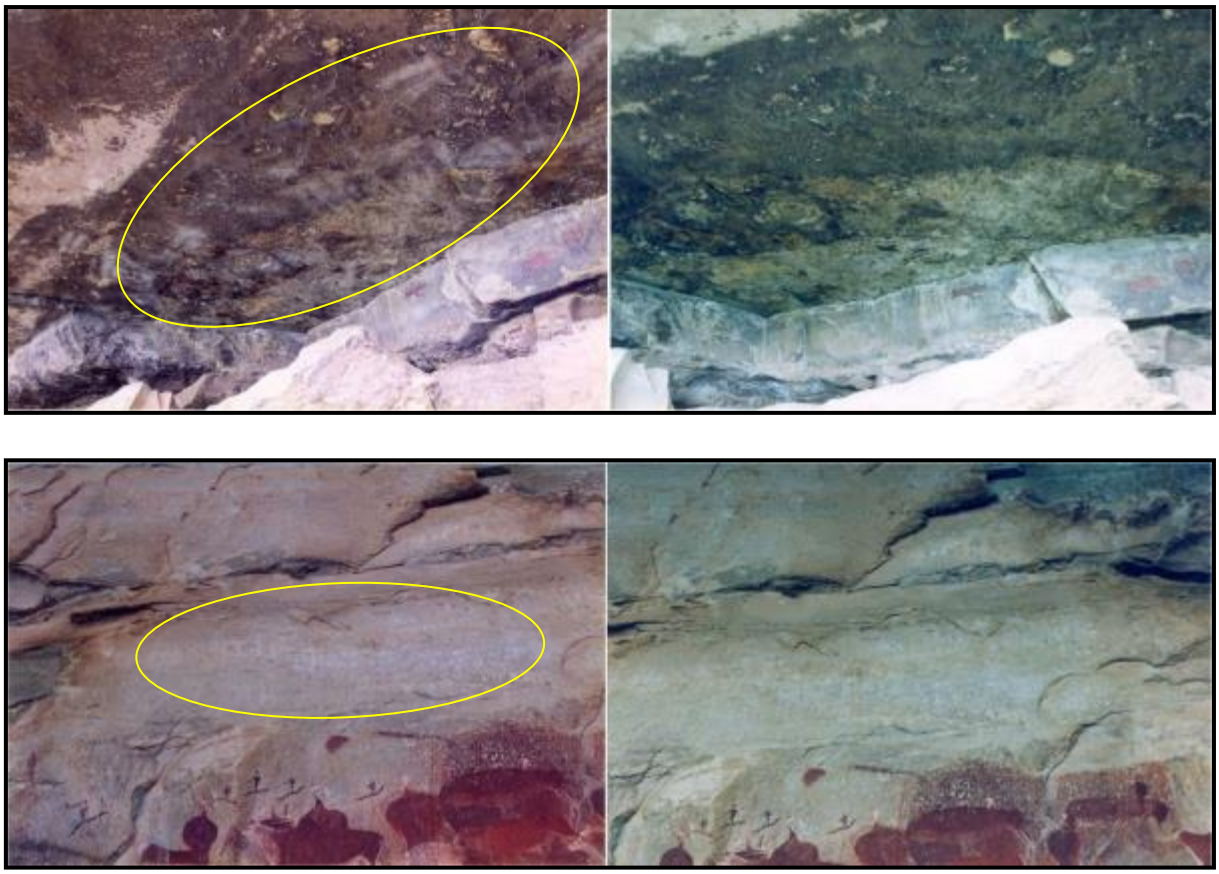


Figure 24a: Treatment record for Game Pass Shelter, Drakensberg [Photos by Claire Dean: 2001]





Figure 24b: Treatment record for Game Pass Shelter, Drakensberg [Photos by Claire Dean: 2001]

Figure 24a shows treated areas on panels 1 and 2. Figure 24b shows treated areas on panels 3 and 4. Figure 24a-b that shows graffiti coating material treatment record for the intervention of the year 2001. Treated areas are shown in yellow circles. The before images (left) clearly show the success of the intervention both in terms of the aesthetics and professionalism.

Graffiti at Game Pass Shelter reappeared and Amafa undertook a retreatment intervention. The impacts of this treatment were recorded during monitoring of the treatment in 2013 by me (Fig. 25). It is unclear who undertook this intervention and when. The reason for the intervention can be determined by studying the images that relate to treatment areas. However, no information pertaining to this

intervention exists. Instead the effects of this intervention can be seen on the rock surface and on images. The aim(s) of the intervention may have been;

- to retreat the negative effects of graffiti
- to restore the site to its previous condition
- to further discourage vandalism of the site

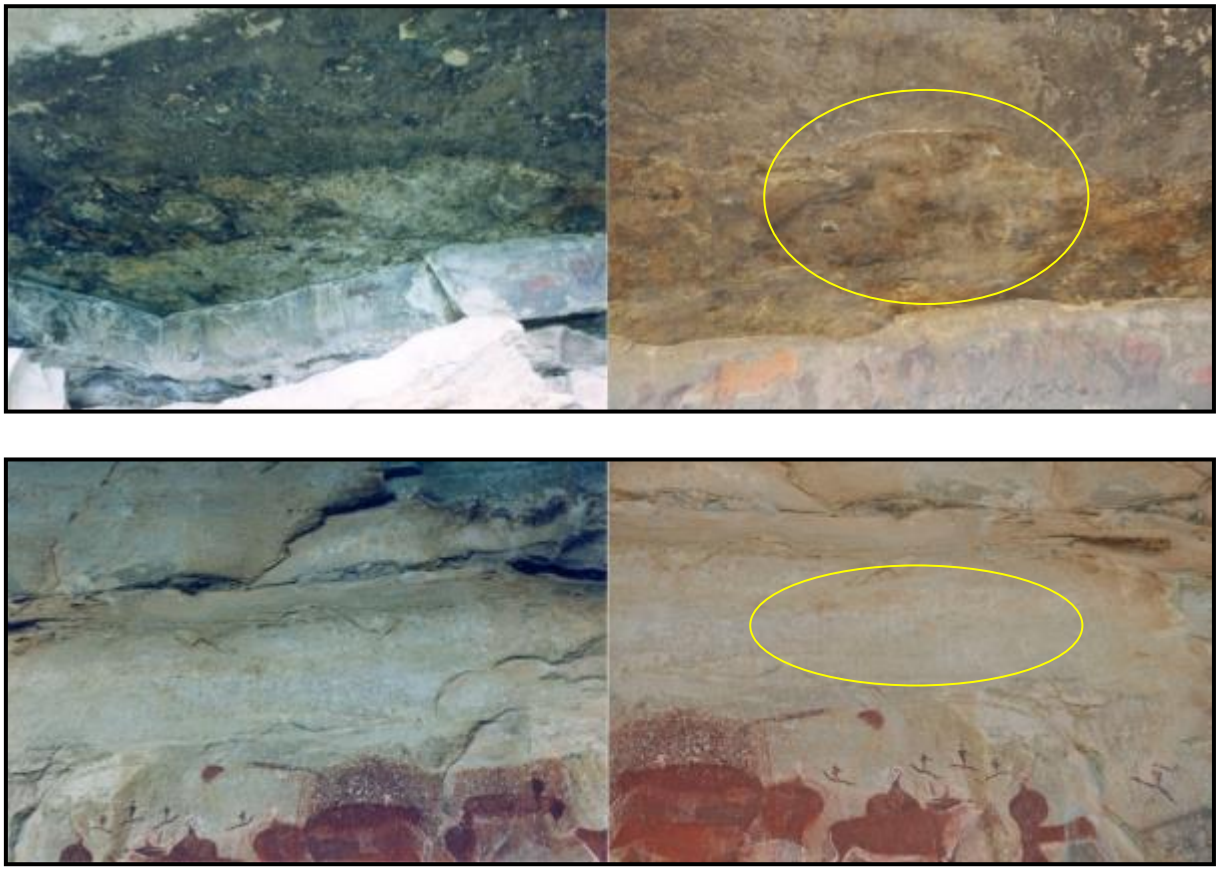


Figure 25a: Treatment monitoring at Game Pass Shelter, Drakensberg [Photos by Claire Dean: 2001 & Elijah Katsetse: 2013]





Figure 25b: Treatment monitoring at Game Pass Shelter, Drakensberg [Photos by Claire Dean: 2001 & Elijah Katsetse: 2013]

Figure 25a shows monitoring of treated areas on panels 1 and 2. Figure 25b shows monitoring of treated areas on panels 3 and 4. The graffiti has since reappeared (images on the right) and another intervention to retreat the graffiti was undertaken. However, this intervention impacted negatively on the images. The impacts of this intervention can clearly be seen. Monitoring of the intervention was undertaken in 2013. Monitoring images (right) show treated areas on panels 1-4 in yellow circles.

8. Hatshepsut Temple, Deir El-Bahari, Egypt

Conservation Intervention of a Wall Painting

The conservation project at the southern Chamber of Amun of the Hatshepsut Temple, Deir El-Bahari began in 2006 and continued through 2007. The scope of the project covered a preliminary survey, construction work, development of optimal conservation methods based on selected media, conservation and

restoration of the wall painting and relief, as well as an aesthetical arrangement of lacuna in the limestone.

A condition assessment was carried out in order to elucidate the factors causing the deterioration of wall paintings and their mechanisms (Uchman-Laskowska 2007). The assessment revealed that exposure to elements (water, dust, sand and stone debris) which were coming through a hole in the ceiling was the major cause of damage. The chemical compounds from the thick black guano layer led to the decay of the binder thus resulting in a loss of cohesion of the paintings (Uchman-Laskowska 2007). The intervention was undertaken using this plan;

- The first phase of consolidation was achieved by injecting water dispersing of acrylic resin PRIMAL AC33.
- The weak porous structure of the ancient plaster was impregnated with FUNCOSIL STEINFESTIGER 300.
- Finally, damaged paintings were restored using minimal plaster containing a substantial amount of gypsum.
-

To ensure the treatment proceeded without any damage being done to the paintings, the ester of silica gel contained in FUNCOSIL STEINFESTGER 300 was applied in conditions of high humidity to attain the best consolidation results. The conservation project effectively restored the painted relief to its original artistic and display values and achieved the objective of clarifying the decoration program of the chamber (Uchman-Laskowska 2007).

# Chapter 5: Results and Discussion

## 5.1. Data Collection

Evaluating past intervention measures is a complex task that requires a system that would maximize the process of data collection. Evaluating and monitoring of past intervention measures requires knowledge of past conservation assessment revelations. This study employed an integrated conservation assessment model that allowed extensive data collection prior to and during field work. Data collection procedures for this study included a combination of field work, desktop surveys, and a literature review of conservation management practice in South Africa. The Dardes' model was used as a guideline in the process of collecting data for the study. Phases 1 and 2 provided the framework for data collection.

### 5.1.1.Phase 1: Preparation: Information gathering prior to assessment

This process provided the skeletal framework of the study. It focused on office and library preparation for the identification of all institutions and agencies responsible for the administration and management of rock art resources *in situ* and *ex situ*. Past and present institutions including the NMC, Natal Museum, and McGregor Museum in Kimberly and the National Museum in Bloemfontein, RARI and SAHRA were identified and consulted in the early phases of the study. The desktop study revealed that the NMC (now the SAHRA), RARI, and the African Rock Art Digital Archives had the material relevant for the analysis of past conservation interventions in the Country. Thus, the data used in this study was acquired from the repositories of the RARI, SAHRIS, and the African Rock Art Digital Archives, National Museums in Bloemfontein. Supplement material were acquired from private collections from researchers and staff at RARI, including Benjamin Smith, Catherine Namono, Siyakha Mguni, David Pearce, Jeremy Hollman, and Aron Mazel. Amafa has also contributed data and material used in this study. This information enabled me to do a thorough review of past rock art conservation and management practice as well as familiarise myself with sites prior to field work.

### 5.1.2. Phase 2: Information gathering during the assessment: Site observation and Consultation

Fieldwork for the project was conducted between March 2013 and July 2014. During this period over 10 rock art sites were visited, 5 of which have been used a case studies in this paper. Site visits were random but attention was giving to the time of the year (season) with which each site was visited. On site images were taken using a Nikon D-300™ camera and additional images were taken using Nikon D-3100™ digital cameras. Both the Nikon D-300™ and 3100™ images are recorded in Tiff files (12.3 mega pixel APS-C sensor and 14.2 mega pixel DX-format sensor respectively). Images were taken at any time of the day when enough light was shone onto the images and high quality images could be captured. Rock art images condition assessment was done using a combination of indices to produce one rock art conservation assessment and monitoring index which I designed specifically for this study (Appendix 1).

Fieldwork was supervised by Professor Benjamin Smith and Dr Catherine Namono at BOE16 in Makgabeng. In the Drakensberg (Main Caves and Game Pass Shelter) fieldwork was supervised by Dr Catherine Namono. The rock art conservation aspect of field work both in Makgabeng and the Drakensberg was done under the guidance of Claire, J. Dean. I was unsupervised when visiting sites in the Cederberg. This allowed me to evaluate my rock art recording skills. In addition to rock art recording and site observation, I consulted rock art officers in heritage agencies and site custodians. This information is crucial and formed part of the comparative analysis between me and other people who by default spend most of their time visiting these sites. Site custodians and rock art officers possess more knowledge about sites and therefore are in a better position to elucidate site conditions. A questionnaire was used to provide uniformity in the process of interviewing people (Appendix 2). All site observations and interviews were analysed and an assessment of past conservation was subsequently done.

## 5.2. Data Analysis

To minimise the level of biasness and to critically and objectively assess the effectiveness as well as to record past conservation interventions a multi criteria approach was employed. This multi criteria approach employed the following elements as guidelines that have previously been used before in evaluating the effectiveness of conservation interventions:

- Evaluation and Monitoring
- Conservation Standards and Indicators
- Evaluation based on Definition of criteria

A conservation condition assessment was done at all the sites during field work. Most of these sites if not all of them have been extensively visited and documented in the past by dozens of researchers. Photographic documentation is a common technique to record images and site parameters in all the sites visited. However, as discussed in chapter three the images are uncalibrated. Furthermore, different types of cameras with different features and qualities are used to record rock art. Therefore, the quality and content of images is not the same this also makes it difficult to conduct photographic monitoring. To address this issue I employed an integrated image enhancing approach whereby a range of digital software was used to analyse images. Photoshop, Xnview, Imagej, and Picasa 3 were all used to enhance and analyse the images of past interventions. The nature of past intervention at Bushmans Kloof 03and 09, Bonne Esperance 16, Main Caves (north and southeast), and Game Pass Shelter was highlighted above, however, this is not a complete and detailed history of conservation interventions at these sites. Below I look at the specific issues encountered and identified at each site with the view of highlighting some practical challenges and issues affecting rock art conservation in South Africa.

**Bushmans Kloof 03 and Bushman Kloof 09**

Conservation interventions at BSK 03 and BSK 09 were undertaken by the Rudner's probably in 1976. It is unclear whether Boontjieskloof 1A and 2A, refer to BSK 03 and BSK 09 as these sites detail similar interventions. Treatment information for Boontjieskloof 1A and 2Ais found in the NBRI-NMC reports (1973) and that of BSK 03 and BSK 09 is found in the management plan of the Bushmans Kloof Reserve (Mguni 2007). Although the interventions at these sites are documented, the information pertaining to the nature of the treatments, aims and materials used during the interventions is missing thus making it difficult to assess their success. These interventions have been monitored twice by Mguni (2007) and by a team of specialist conservators from the Getty Conservation Institute (GCI) whose report is pending.

Monitoring by the GCI conservators focused mainly on drip lines as part of an educational program under SARAP. The drip line at BKS 03 according to Mguni (2007) has negative effects on the images below it and to the left. The drip line could be trapping water, thus allowing the surface to absorb this water creating a ripple effect in the direction of images below it. The negative effects of the drip line could be due to the positioning and placement of the drip on the ceiling of the shelter. If indeed the drip line is impacting negatively on the images remedial action to mitigate these effects should have been taken and should be taken as a matter of urgency.

A closer look at the wash zones and pigment layers on the surface suggests that the drip line is not mitigating the impact of water on the images and may indirectly be exacerbating the problem. The drip lines were probably an experimental installation that was investigating probable solutions to the problem of direct water erosion. However, this work was cosmetic and the drip line is not mitigating the impact of water on the images. Thus, the drip line should not have been installed and it should be removed. This intervention underscores the significance of monitoring and a proactive conservation approach and the need for specific principles in policy that

address conservation interventions. The specific conservation principles for the installation and monitoring of drip lines at NSW, Australia provide a good example for a conservation protocol successfully implemented.

Contrary to the intervention at BSK 03, the consolidation of the surface at BSK 09 appears to have been successful and is performing positively. As discussed in section 2 of case studies the protective layer of 'varnish' appears to exhibit the qualities of a good consolidation agent. It has not changed the moisture and temperature regimes of the rock surface. The moisture and temperature regime of the treated area appears similar to that of the area not treated. Therefore, the layer of 'vanish' allows the surface to breathe freely thereby not creating pressure within the rock to induce chemical and physical weathering. This intervention at this point in time indicates the use of appropriate material to address a specific problem.

**Bonne Esperance 16**

The conservation report produced for the conservation treatment undertaken at the site makes mention of past interventions at the site. However, no record of these interventions exists. The knowledge of these interventions lives in the memory of people particularly staff at RARI. Therefore, the conservation record of BOE16 starts in 2013 with the treatment done by Clare Dean. This is because information about conservation work extends beyond the treatment itself it goes to the nature of the intervention, aims, and materials used. Without this information nothing can be said about such an intervention. The recent intervention at BOE16 was only effective for a short period. The failure of the treatment could be attributed to the level of planning involved in intervention and the use of inappropriate techniques. The condition assessment was done on site, the same day the treatment work began and intervention techniques were determined on site.

The manner of the intervention at BOE16 appeals to conservation protocols and policy. SAHRA does not have specific protocols to address rock art conservation as such; there is no proper and adequate planning prior to interventions. Furthermore,

the permitting process is flawed and does not make provision for submission of a condition assessment with a request for permit to intervene. What is important here is that funds were provided for the intervention and a conservator was brought in but management authorities (LHRA) were not prepared and had not adequately planned for the intervention. As such a ladder was used instead of more stable scaffolding that would have provided both stability and height to reach ledges above the main panel where birds and bats are roosting. As a result the problem was not properly addressed.

Furthermore, the intervention could have been more effective and successful in the long term had the intervention been adequately and properly planned thereby undertaking an intervention that would have been well informed by site conditions. As such proper material and/or preservation techniques could have been used including amongst others the installing a fine mash net to cover the roof of the shelter to deter birds and bats from roosting on the ceiling.

**Main Caves (north and southeast)**

Main Caves' rock art sites have an extensive and long history of conservation work since 1958 whenrock surfaces at Main Caves north was treated with resin silicon (Smith, pers comm. 2014). However, physical alteration of the sites began in 1967 under the auspices of the Natal Parks Board. The sites were extensively altered for public visitation and to protect them from vandalism. The site wall at Main caves southeast was dug out and/or quarried for material that was used to pave the floor of the shelter (Dean, pers comm. 2013). The floors of both sites were paved and a chain mounted on iron rods was used as railing to reduce dust and control visitor movement respectively. These interventions were not effective in both reducing the level of dust and preventing visitors from jumping the chain and touching the images. In 1998 Amafa and Ezemvelo KwaZulu-Natal Wildlife undertook a project to install a boardwalk at the sites. This project resulted in the removal of the

vegetation in front of the shelter. This vegetation shielded the sites from the elements of weathering.

Photographic monitoring of weathering at Main Caves done in 1994 (Ward) and 1997 (Ward and Maggs), indicated no significant changes in the condition of the images. Given that photographs used to monitor image condition changes at Main Caves were uncalibrated, the observations made could not be accurate and conclusive. Both studies revealed that exfoliation of the surface were a major threat to the site particularly the main panel. Recent weathering studies suggest that the removal of the vegetation in front the shelter may have resulted in increased rates of exfoliation of the rock surface (Meiklejohn *et al.* 2009). Furthermore, the deterioration of the rock substrate where images are located coupled with the deterioration of the ground clay base where images are located affects the weathering of paintings. Given these revelations and conditions at the sites, one would expect the stabilization of the rock substrate and modification of the vegetation in front of the shelter would be prioritized in conservation decisions. However, the recent interventions at Main Caves focused on the treatment of dust and bird droppings. This thus begs the question of the *criteria used for prioritizing the conservation needs of the site* and *what informs conservation decision* taken about sites.

The question of conservation protocols and criteria used to prioritize conservation reflect on poor rock art management practice. Poor rock art management in the Drakensberg is further compounded by the issue of CRM archaeologists who tend to practice outside their accredited fields of speciality. I am referring here to an attempt that was made to treat graffiti that resulted in unsightly and bad scratches on the rock surface and in other areas near images. This work was clearly done by a conservation enthusiast and an amateur. Amafa has no record of this treatment which further begs the question, was a permit acquired to undertake such work as required under section 35 of the NHRA (25 of 1999). The key outcomes of the assessment at Main Caves show that conservation interventions have been largely

influenced by activities to encourage public visitation and need to improve the experience of visitors. Furthermore, in the Drakensberg there are cases were people not trained in rock art conservation principles have undertaken conservation work. Finally, the potential impact of removing vegetation to install the boardwalk could have on the images underscores the significance of documenting and monitoring conservation interventions. The attempt to remove graffiti on the hooves of an eland motif left a stain that gives the impression that the image was depicted on top of something. This could impact on future interpretation of the image.

**Game Pass Shelter**

Game Pass Shelter is affected by both natural and anthropogenic factors of deterioration. However, anthropogenic factors particularly graffiti effects severe damage to the site. The problem of vandalism at the site has a long history and is persistent. In 2001 and intervention was undertaken to remove graffiti at the site. The intervention was successful in hiding and masking the impacts of graffiti. However, the graffiti has since reappeared because the material used in coating it had worn out. Certain individuals did not take guidance on this and took it upon themselves to remove the graffiti. Someone attempted to retreat the graffiti with or without knowledge of Amafa albeit with detrimental effects. It is unclear what techniques was used in this intervention or whether this person was trying to copy the work done by RARI, Janette Deacon, and conservator Claire Dean. A similar incident was observed at Main Caves which suggests that the problem of archaeologists who tend to practice outside their fields of speciality is common and severe in the Drakensberg. This observation has also been made elsewhere and such deeds go unpunished (Ndlovu 2011). The damage of rock art by conservation enthusiasts shows that Amafa is failing to enforce the legal principles of heritage legislation. This therefore, suggests that in areas where the legislation provides clear guidelines for heritage protection, the lack of accountability and responsibility of heritage practitioners affects proper care of rock art.

### 5.2.1. Phase 3: Comparative analysis and Strategies

It was important that this study looks elsewhere to see what has been done but how successful it was, hence I drew  case studies from America, Australia, and Egypt (see Walston & Dolanski 1976; Brink 2007; Uchman-Laskowski 2007). I considered the time taken to conduct a *condition assessment and characterization of materials making up the site, if the conservation protocol was followed, was a treatment plan outlined, were the results of the intervention monitored,* elsewhere compared to South Africa.

At Main Caves and BOE16the characterisation of the material was not done and the intervention was done after condition assessment. Regardless of the experience of the conservator, characterization of materials making up the site is a pre-requisite to any intervention. Therefore the interventions at Main Caves and BOE16 risk inducing chemical reactions that may alter the chemical composition of pigment and the substrate, thereby, inducing weathering. Climatic conditions in the study regions chosen here have not been stable in the past and show a lot of variability (discussed in chapter one). These changes could have induced accelerated damage on the images. The possible reaction that could be induced by using water in cleaning rock art surfaces could occur in one of several ways. Contextual assessment of the study regions show the images are depicted on sandstone albeit of different kinds. Sandstones materials, however, have general composition (discussed in section 4.2). Below I show basic chemical reaction that may be induced by treating surfaces using water.

Feldspar and water: Key in the reaction between feldspar and water is the amount of water added.

1) $3KAlSi_3O_8 + H_2O \rightarrow KAl_3SiO_{10}(OH)_2 + 6SiO_2 + 2K + 2OH$
2) $2KAl_3Si_3O_{10}(OH)_2 + 5H_2O \rightarrow 3H_4Al_2SIO_9 + 2K + 2OH$
3) $2KAlSi_3O_8 + 3H_2O \rightarrow H_4Al_2SiO_9 + 4SiO_2 + 2K + 2OH$

Quartz, water and pigments:

1) $SiO_2 + 2H_2O \rightarrow H_4SIO_4$
2) $SiO_2 + 2C \rightarrow Si + 2CO$
3) $SiO_2 + Fe_2O_3 \rightarrow SiO_2 \cdot Fe_2O_3$
4) $SiO_2 + 2Mn \rightarrow 2MnO + Si$
5) $2MnO + 2Si + 2H_2O \rightarrow 2H_2SiO_2 + 2Mn$
6) $SiO_2 + 2MgO \rightarrow Mg_2SiO_4$
7) $Mg_2Si_4 + H_2O \rightarrow Mg_2SiO_6$
8) $SiO_2 + MgO + H_20 \rightarrow Mg_7(Si_4O_{11})_2(OH)_2$

In Egypt, the conservation project at the southern Chamber of Amun of the Hatshepsut Temple, Deir El-Bahari began in 2006 and was continued through 2007 and the conservation protocol was followed. Similarly, conservation work at Mount Grenfell in the state of NSW the conservation protocol was followed conservation project. These two case studies from Egypt and Australia were chosen because they highlight standards of good practice in the field. The amount of time invested in research and the level of data acquired allowed for appropriate intervention measures to be developed and implements. This also shows the level of planning required for a successful conservation intervention undertaking.

In the state of NSW, Australia monitoring of drip lines has two obligations for the DECC field managers; 1. They should repeatedly (every 5 years) observe a sample of sites where drip lines have been introduced for any adverse effect and consult the local community where necessary, and 2. They must be prepared to remove drip lines in consultation with the local Aboriginal community if long term impacts result and this is in accordance with article 2 of the Burra Charter (1981) (Lambert 2007).

The nature of conservation management practice in South Africa and southern African as a whole has been explored in detail in this study. Major issues affecting the conservation practice in southern Africa are the lack of funding, a regional strategy and most of all the lack of expertise. Conservation interventions to address various factors causing the deterioration of rock art have been undertaken in southern Africa, South Africa included. The influence of management approaches and/or of heritage management on rock art has also been investigated and highlighted in this study. The failure of legislation in contributing to the effective management of rock art in South Africa has also been discussed with the view identifying which elements of the legislation are impacting on the management of heritage resources. Where the legislations provides clear and precise guidelines for the protection of heritage resources there is a lack of responsible and accountable personnel to enforce the law. Thus, heritage agencies are failing in the management and administration of cultural resources.

Heritage management approaches in Africa have not evolved with the conservation and management discipline. Furthermore, the western management approach is now operating in democratic societies. Management approaches under the western system of management lacked dialogue and are discriminative of contemporary society's value systems. The colonialism of African states on its own has affected changes in the management of heritage resources notably a shift from the local Indigenous management system to the western management system.

The legislation has further transferred ownership (administration and management) of heritage resources into the hands of the states. This indicates a lack of coordinated effort from a local level in the conservation and management of cultural resources. Rock art occurs in diverse landscapes such as private lands, National Parks, WHS, communal lands where it is exposed to various threats and governed by multiple laws. The study of rock art interventions using rock art sites

from diverse cultural and management landscapes has revealed issues with the three tier management system of NHRA.

The decentralisation of administration and management roles from national to local level affects and compromises the protection of rock art. SAHRA has no specific conservation protocol for undertaking conservation intervention where else Amafa employs the cure document. Conservation Protocols should be developed at national level and trickled down to regional and local level. This shows a coordinated management and protection approach. However, in South Africa there are no criteria for prioritizing conservation interventions. Without criteria for undertaking conservation intervention as shown by practical examples makes conservation intervention a cosmetic and, most importantly; a risky undertaking.

The use of practical examples in the form of case studies has further revealed issues that can be described as an Achilles heel to rock art conservation practice in South Africa. The lack of inventories in Africa is still a major issue. The lack of data as it has been shown makes it difficult, if not impossible to evaluate and monitor results and effectiveness of past conservation interventions (Table 4). This has been a long standing issue in South African rock art studies especially when it comes to monitoring rock art site conditions. Mazel (1982, 1983) has always posed the question of whether there was enough data to base the monitoring of rock art in the Drakensberg. Amafa has recently embarked on a project to identify all the information pertaining to rock art of the Drakensberg with the view of creating a library that will further aid with conservation work. Furthermore, in 2013 they listed a contract for a development of a monitoring program for rock art sites in the Drakensberg. When I enquired about the progress of this work it appeared that nothing has come of the work as yet and Amafa still uses the old card system (Celeste Rosouw, pers comm. 2013, 2014). Heritage agencies charged with the administration and management of rock art lack responsibility and accountability and this is saddening considering that heritage managers are also conservators (Dandridge 2000).

The lack of expertise in southern Africa rock art conservation is also a long standing issue. In chapter 2, I critically assessed its causes and effects on the discipline of rock art conservation in southern Africa. I condemned over reliance on foreign expertise and funding. I argue that rather, we should have 'home-grown' conservation specialists and source conservation specialist from abroad on big projects to act as facilitators. This strategy will prevent archaeologists from destroying cultural objects of significance whilst believing they are conserving them. . Furthermore, archaeologists no longer act as stewards of heritage resources but as a secondary owner. Archaeologists are secondary owners' to the state As such there is a conflict of interest and archaeologists tend to mobilize communities to take pride in their heritage often when it will benefit archaeology in return (Ndlovu 2014a). However, when communities want to use cultural objects to perform rituals to appease the ancestors they are denied access to them on the basis of complex management approaches. This according to Ndlovu (2014a) is an unethical stance archaeologists often take.

Table 4. The history of conservation intervention at each site chosen visited during fieldwork.

| LOCATION | TREATMENT(S) | DATE | RESULTS | REFERENCE(S) |
|---|---|---|---|---|
| **Bonne Esperance 16, Makgabeng** | Surface Cleaning (Dust & Guano) | 2013 | Ineffective | Dean 2013 |
| **Bleeding Nose Sites, Cederberg** | Protective Layer (Surface Consolidation) | *ca.* 1976 | Needs research | NBRI report 1973; Mguni 2007 |
| **Game Pass Shelter, Drakensberg** | Graffiti coating | Mid-1990s | Effective: needs research | Katsetse 2014 |
| | Graffiti removal | n.d. | Disastrous | Katsetse 2014 |
| **Main Caves north & southeast** | Surface coating | Mid-1900s | Unknown | Malan 1958 |
| | Fence<br>Floor paving<br>Quarrying<br>Chain railing<br>Display signs | 1967 | Effective short term<br>Not effective long term | Wahl et al. 1998<br>Duval & Smith 2013 |
| | Boardwalk<br>Display signs<br>Visitor book<br>Tour guides | 1998 | Mixed outcomes. The effects of removing vegetation to install the boardwalk needs research | Wahl et al. 1998<br>Duval & Smith 2013 |
| | Surface Cleaning (Dust & Guano) | 2013 | Effective | Dean 2013 |
| **Sonja's Lower Cave, Cederberg** | Drip line installation | 1976 | Not effective; Should be removed | Mguni 2007 |
| **History of conservation intervention(s) at rock art sites chosen in this study** | | | | |

## 5.3. Conclusion

In this chapter, I identified the materials (pigments, rock substrate and the surrounding environment) making up rock art in South Africa with the view of elucidating the mechanisms of deterioration. Major factors causing rock art deterioration were also identified and possible preservation techniques to ameliorate them were discussed. The interplay between rock art and their surrounding geological, biological and meteorological environment is complex and takes numerous processes in causing rock art deterioration. Moisture and temperature are identifies as the major factors causing rock art deterioration.

Damage to rock is also caused by human induced factors. Treatments to deal with decay range from simple to complex. These treatments can be mechanical, physical, and chemical. The treatment history of rock art in South Africa was further outlined. The study of the intervention and treatment history of rock art in South Africa was done using case studies. A comparative analysis of conservation practice in South Africa and Australia, America, and Egypt in particular was done. This analysis revealed contrasting difference in the nature of conservation practice and management approaches.

# Chapter 6:A CONSERVATION MODEL

## 6.1. Recommendations

Recommendations are crucial for developing mitigation measures, conservation measures, protocols, and policy. Recommendations are part of a diagnosis process guided by results of a thorough assessment of conditions and the situation on the ground. Often recommendations are made in consultation with relevant stakeholders which may include the local community, tourism officials and the managing agency based on the strengths and weaknesses of the managing agency. I adopted this precept and engaged with researchers, site custodians and heritage officers to gauge what would constitute an effective conservation model that would put systems in place to better manage conservation interventions. This interaction coupled with results from past conservation interventions in South Africa guided the development of the model.

The history of rock art preservation in South Africa reveals that there is a lack of conservation intervention planning and research is not directed toward developing conservation treatments and measures that respond to specific site conditions. Secondly, conservation intervention projects are often imposed upon heritage authorities and /or managing authorities. In cases where heritage agencies have initiated conservation projects they are often blindsided because they do not have the necessary skills and conservation expertise. Funds to undertake conservation projects are often not controlled by heritage authorities or managing agencies. Furthermore, managing authorities do not have measures to regulate and control the direction of interventions. As such conservation interventions are often not monitored or properly managed. There is a lack of compliance and failure to implement recommendations by rock art managing agencies. As it has been shown elsewhere (Mazel 2012; Ndlovu 2014b), this failure has had a negative effect on the good and successful management of rock art. This study has had to battle with this recurring tendency and how it could

impact on the outcomes of this study. Thus, the model developed in this study will have to be simple and respond to specific issues that affect proper management of conservation interventions.

I therefore, propose a conservation model for rock in South Africa from a management perspective. This model is derived from the description of conservation and preservation adopted in this study and it is guided by results on past conservation assessments. A three-pronged protocol that focuses on rock art conservation project management components of initiating, planning, and control (Fig. 26).

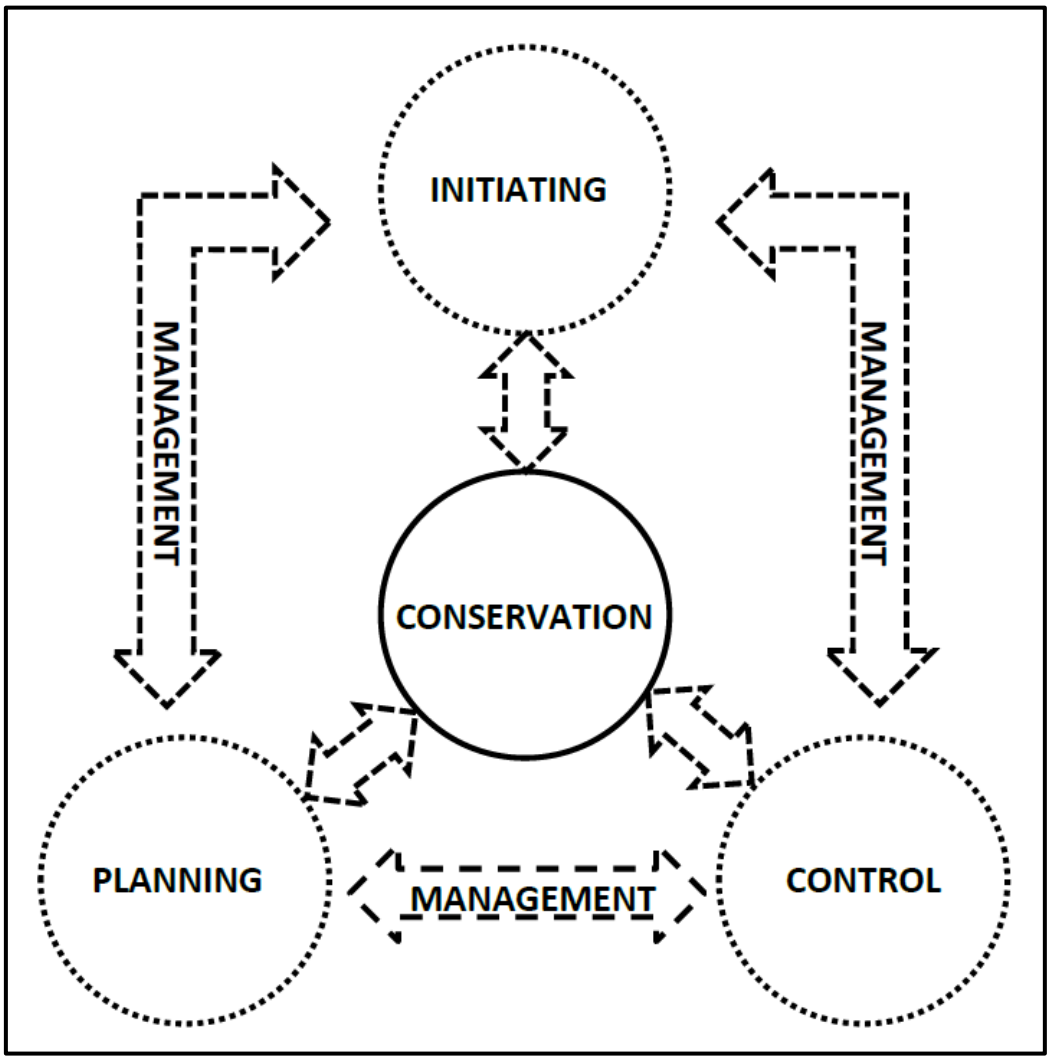



Figure 26: The conservation model for rock art in South Africa

Management components are significant in the life of a project and its successful implication. Project management components include initiating, planning, executing, closing, and control (Learner Book 2012).Project management components are similar to the conservation process (Fig. 8). The impacts of a conservation intervention extend beyond the life of a project and as such the project cannot be closed. A conservation project is developed with the view of undertaking an intervention thus a conservation project is in itself execution. Therefore, I omit closing and execution in the model on rock art conservation, Thus initiating, planning, and control are important in conservation intervention management and are in tune with contemporary conservation theory, the value-based approach, and the scientific approach. These elements revolve around heritage management plan principles (Fig. 27). Conservation decisions, interventions, priorties should bedetermined by and in line with principles of the management plan. This model (Fig. 26) takes cognisance of the elements and principles of a managemt plan thereby, taking conservation practice back to the basics of initiating, planning, and controlling.

The model is important and provides measures to improve conservation practice in South Africa. It addresses policy matters such as permits and requests for permits, Heritage Impact Asessements, and Archaeological Impacts Assessments. The model defines conservation on the basis of the physical matter (rock substrate, pigments, and the surrounding environment) and preservation on the basis of governance (people, significance, and place). Thus, it is an ideal measure derived from principles of preventive conservation and elements of NHRA (25 of 1999).

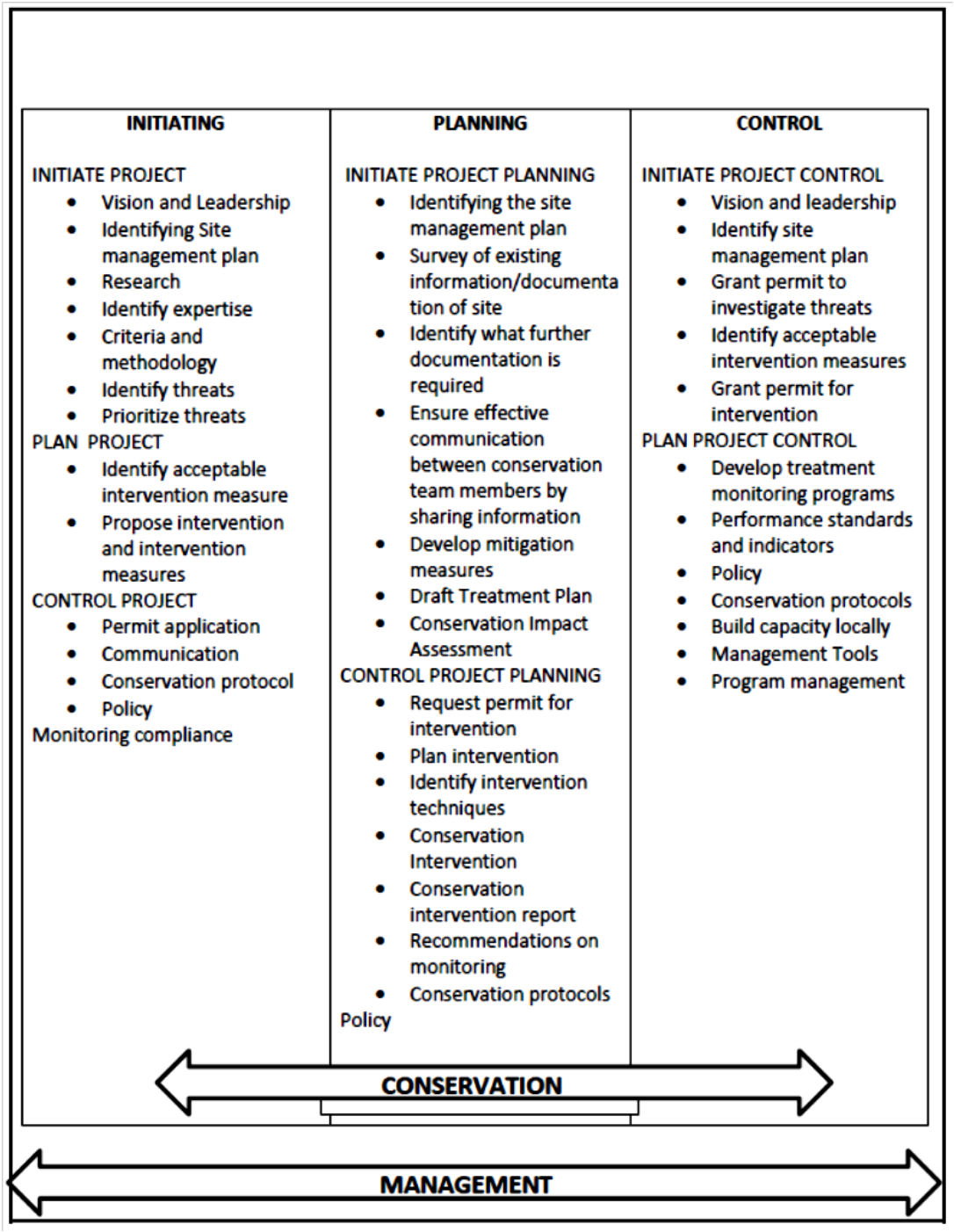



Figure 27: Articulation of the model**.**

**Project Initiating and Planning:**

Conservation as defined in this study sets a precedent that is internationally recognised for undertaking intervention or restoration work on heritage objects. The conservation protocol requires that prior to conservation a thorough site investigation to identify factors causing deterioration and how they manifest should be done. As discussed in chapter two this investigation should be coupled with library work that will study past records of the site to see what is available and what more is required to better understand site conditions. This approach is adopted internationally and this study has demonstrated its effectiveness in the case of Mount Grenfell (Australia) and Hatshepsut temple, Deir El-Bahari (Egypt). I argue that if there were proper measures put in place and the conservation protocol followed in rock art intervention at BSK 03 and BOE 16 the treatment work would have been informed by prevalent site conditions. As a result adequate mitigation measures would have been developed and implemented to ensure long-term preservation of rock art.

However, rock art conservation practice in South Africa does not adhere to intervention principles. The lack of funding and the affordability of conservation specialists are often cited as the major reason for this misconduct. Conservation specialists are indeed expensive to hire but this is no reason enough for cutting corners and risk damaging significant cultural objects. Funds were provided for both the intervention projects at BOE 16 and Main Caves but treatment work did not follow the conservation protocol. This indicates even when funds to undertake conservation work is made available the problem of in conversation practise still persist. The problem could therefore lie on the lack of conservation expertise and knowledge on the part of heritage agencies and rock art officers. The lack of knowledge on what conservation entails is hindering research to build knowledge on conservation and to develop criteria to prioritise conservation. As a result the treating of dust and guano at Main Caves was a cosmetic undertaking. Similarly the installation of a drip lines at BSK 03 was a cosmetic undertaken because of the lack of knowledge on conservation issues and status of rock art sites and paintings. The interventions at BSK 03 and Main Caves in particular

wasted limited resources because treatment was undertaken on less destructive factors. Conservation is a sub discipline of CRM and problems that affect conservation practice originate from CRM. I propose that conservation practice in South Africa be reconfigured into CRM. I am well aware of the issues that affect CRM but what I am proposing here, I believe will work if this recommendation is followed accordingly (Figure 26):

- Conservation should be considered as development as defined under section 38 of the NHRA (25 of 1999).
- This will mean any activity that will occur within the 10m prescribed radius of a rock art site will require a:
  - Conservation Intervention Proposal
  - Conservation Impact Assessment
  - Conservation Treatment Plan
- This should be done as part of the Archaeological Impact Assessment

**Project Planning and Controlling:**

Management as defined in this study responds largely to issues of stewardship, expertise, local communities, heritage places, and the significance of heritage places. Results of this conservation assessment indicate that professionalism and standards of good practice are major issues that need to be addressed. To address issues of professionalism, ethics, and standards of good practice, SAHRA as the implementing agency of DAC should make an Act of Parliament that makes it mandatory for all persons practising archaeology to be registered members of the Association of Southern African Professional Archaeologists (ASAPA).This way ASAPA may be in a position to act on those members who do not adhere to its code of conduct. The scenarios at Main Caves and Game Pass Shelter provide evidence of unethical practice that is in contravention of section 35 of the NHRA (25 of 1999). This issue is likely to have been exacerbated by the incompetence and failure of heritage officers to enforce legislation and compliance.

Greater diligence in the permitting process is needed to encourage compliance. The lack of compliance on the part of conservation professionals in practice could be encouraging enthusiasts and amateurs to undertake conservation work. Site managers are in themselves conservators and as such they should promote responsible conservation practice. The paucity of conservation and rock art inventories is partly influenced by the lack of compliance on the part of researchers. The conservation model proposed here partly addresses this issue by tracking all the steps of the conservation process and giving each phase an autonomous status that requires a permit for intervention (Fig. 25). This model does not provide a panacea for the ills of the conservation discipline in South Africa; it provides a framework to improve conservation management. The way forward in rock art conservation should be sought in research and developing preservation techniques.

## 6.2. A Way Forward

Rock art conservation in South Africa can be improved if management practice adheres to standards of good practice. Heritage authorities have not been able to promote ethical conservation due partly to the lack of conservation knowledge and what it entails. Conservation is employed as a mitigation measure to ameliorate rock art deterioration as such it is management's responsibility. Management objectives and only management objectives should guide conservation. The protection and administration of rock art is the responsibility of heritage agencies and these agencies should establish site recording standards, the level of data required, and establish standards and performance indicators. I thus propose as a first step heritage agencies should develop rock art recording techniques that will improve our understanding of rock art and help with management decisions. Furthermore, there is a need to develop criteria for the prioritisation of conservation. Management agencies should focus on developing strategies to deal of the issues of graffiti. The removal of graffiti has had mixed results and impacts on rock art. Graffiti as an alteration to a site forms part of the

site's history whether removed or left intact. It should be properly recorded and used in conservation education.

Rock art recording is an integral component of rock art research. Adequate and proper recording of rock art allows for better interpretation, conservation and management. However, rock art recording as a function or tool for conservation management depends on the technique and method used for recording. Theories, methods and practice have moved beyond the sole focus on rock art imagery to the site and general surrounding due to conservation needs which also incorporates the natural landscape (Loubser 2001). Rosenfeld (1988: 14) argues that "clear and precise records of the condition of the art and general features of the site are essential in monitoring the stability of rate of decay of rock art".

## 6.3. Further Research

This original research on rock art conservation assessment in South Africa indicates that (see chapter two) conservation assessment is a relatively new subject of enquiry. Assessing past rock art conservation interventions has proved difficult on a practical level. Rock art conservation assessment undertaking was restricted by the paucity of data on the conservation status of rock art sites and paintings. As such a detailed history of past interventions at BSK 03, BSK 09, BOE 16, Main Caves, and Game Pass Shelter could not be created. There is a need to build research on conservation in order to assist with long-term preservation of rock art. I therefore, propose that a conservation assessment project on past conservation interventions is undertaken on a national scale to expand the work established by this study.

An outcome of this study is a conservation model and a rock art recording and monitoring index to improve management tools and recording techniques (Appendix 2). The recording and monitoring index employed in this study generated contextual data on site conditions. These contextual data enabled objective assessment of past interventions at each site. Thus, future research should focus on improving and developing new rock art recording techniques.

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(Benjamin Smith, pers comm. 2013, 2014)

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(Jeremy Hollman, per comm. 2014)

(Ndukuyakhe Ndlovu, pers comm. 2014)

(Siyabonga Mbata, pers comm. 2013)

(Siyakha Mguni, pers comm. 2014)

# APPENDICES

Appendix one: Rock art conservation assessment and monitoring index

**ROCK ART CONSERVATION ASSESSMENT AND MONITORING INDEX**

| Condition and Conservation Record | |
|---|---|
| **General Site Information** | **General Site Information** |
| **Site Name** | **Site ID** |
| **Panel#** | **Managing Agency** |
| **Site Type** | **District** |

| General Site Information | General Site Inform |
|---|---|
| **GPS Recordings** | **Painting(s)/Engravings** |
| **Site Dimension: Height:**<br>**Width :**<br>**Other :** | **Painting(s) Technique(s)** |
| | **Engravings Technique(s)** |
| **Aspect & Angle** | |
| | **Paintings Colour(s)** |
| **Substrate** | |

| Condition Assessment Details | Condition Assessment Details |
|---|---|
| **Assessment Level: Basic:**<br>**Intermediate:**<br>**Detailed:** | **Time** |
| | **Weather** |
| **Date** | **Temp. & RH** |

| Topography/General Site Description | General Description of Images And Conditions |
|---|---|
| | |

**Factors Causing And/or Contributing To Rock Art Deterioration Observation**

| **Natural Deterioration** | **Artificial/Cultural Deterioration** |
| --- | --- |
| | |

**General Comments:**

**Conservation Intervention Assessment & Monitoring**

| Treatment/Intervention Observation | Treatment/Intervention Observation |
|---|---|
| **Past/Present Treatment:** | **Date** |
| **Type of Intervention:** | **Season/Time** |
| **Aim(s) of Intervention:** | **Existing Documentation** |
| | **Samples Taken** |

| Treatment/Intervention Observation | Treatment/Intervention Observation |
|---|---|
| **Material(s) Used during Intervention:** | **Previous use of agent(s)** |
| **Name of agent(s) used:** | **Properties of agent(s) (Physical & Chemical):** |
| **Chemical Formulae of agent(s):** | |

**General Comments: Results and Effectiveness.**

**Conservation Intervention Assessment & Monitoring**

| **Treatment/Intervention Record** | **Treatment Intervention Record** | | | | | |
|---|---|---|---|---|---|---|
| **Material Characterization**<br>**Type of substrate:** | **Mineral Composition:** Tick Correct box | | | | | |
| **Physical Properties: Weak:**<br>**Moderate:**<br>**Strong:** | Aluminium Oxide | | feldspar | | Lime | |
| | Calcium Carbonate | | Quartzite | | Iron | |
| | Magnesium | | Illium | | Quartz | |
| | Gypsum | | Silica | | | |
| | | | | | | |

**Paintings Characterization**

| **Name(s)** | **Colour(s)** | **Chemical Formulae** | **Values/Use** |
|---|---|---|---|
| **Red Ochre/Oxide** | **Red** | | |
| **Clay (White)/Chalk** | **White** | | |

| | | | |
|---|---|---|---|
| **Charcoal** | **Black** | | **Dating** |

**General Comments: Condition & Conservation.**

| **Monitoring** | **Monitoring** |
|---|---|
| **Monitoring Timeframe: Immediately:** | **Monitoring Level: Basic:** |
| **Three(3) Months:** | **Intermediate:** |
| **Six(6) Months:** | **Detailed:** |
| **Other:** | |

| **Monitoring** | **Monitoring** |
|---|---|
| **Monitoring Methodology:** | |
| **Monitoring Technique(s):** | |

Appendix two: Questionnaire on permit issuing process for undertaking conservation interventions.

| | |
|---|---|
| **Name** | Elijah Dumisani Katsetse |
| **Affiliated Institution** | University of the Witwatersrand, Johannesburg |
| **Document Format** | Questionnaire |
| **Purpose** | To establish the Process of issuing permits for conservation interventions as part of an on-going *MSc* research projects. |

***NB: To be completed by the rock art expert and conservation expert of the SAHRA council.***

| |
|---|
| **1. What criteria are being used by SAHRA to evaluate the methods of intervention?** |
| **2. How are the risks associated with any treatment/technique assessed?** |

| |
|---|
| 3. **Which general conditions, causative factors, and risks are characterized and prioritized?** |
| 4. **Does SAHRA have a backdrop of past conservation intervention to measure the proposed treatment treats against?** |
| 5. **Is enough information available to sustain a recommendation to use this or that treatment?** |
| 6. **What criteria are used to assess the effectiveness of conservation treatments?** |

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| **7. Which monitoring system(s) are used in monitoring and evaluating treatment(s)?** |
| **8. What measures are in place to ensure the conservation principles inscribed in policy are upheld in practice?** |

## Appendix three: List of Tables

Table 1:Principles of heritage documentation
Table 2:Four stages of the Dardes' model
Table 3: Pigment colours and composition
Table 4: The history of conservation intervention at each site chosen visited during fieldwork.