



Constraints and stakes in enhancing archaeological landscapes in the digital age

Léa De Bruycker, Yves Girault

National Museum of Natural History, Paris, France



Current threats on archaeological landscapes

1 Assessing the current situation of threats on rock art

The dangers affecting ancient rock art, whatever its nature and in whatever location, may be seen to fall into two categories. The first category includes various hazards linked to the natural environment of the sites, whether they be climatic, climato-edaphic or biological; from deep fractures in the rock as a result of alternating dry and wet weather conditions; to superficial abrasion and alteration by aeolian erosion, or localized interference from fauna or flora. Any of these agents are liable, at any point in the geological history of a site, to affect the interpretation of a group of figures, or to make them illegible, or even to make their very presence altogether invisible through the dissolution or fragmentation of the supporting rock face. For example, the colour Neolithic stone paintings at Laas Geel in Somaliland are today in a vastly variable state of preservation (Gutherz & Jallot, 2011) because the site, located at the meeting point of two rivers and which has been left unenclosed. The site has remained a grazing ground and is a natural habitat for baboons, as well as a regular nesting spot for many birds, causing massive deterioration to the painted rock walls. This is probably the case ever since the paintings were made.

Another group of external interference affecting rock art involves human actions through the course of history. These alterations are manifold and result from widely different motives, some more complex, or indirect, than others.

Some are the result of a variety of human-generated pollution throughout history. For instance, acid rains originating from industrial pollution in the mid-20th century

Author: Léa De Bruycker, National Museum of Natural History, Paris, France, 75020.

Yves Girault, National Museum of Natural History, Paris, France, 75020.

Email: yves.girault@mnhn.fr.

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have destroyed a major proportion of the open-air rock art of Scandinavia (Clottes, 2002). Even today, the continued expansion of agricultural, urban, and industrial activities, such as mining, as well as the increased infrastructure, is a growing threat to some major rock art groups. This is the case of Australia's Burrup Peninsula (a.k.a. Murujuga), where the world's largest concentration of rock art is presently facing total annihilation through the building of natural gas, fertilizer and even explosives factories and the associated roadworks. As of the beginning of this century, 25% of the 300 000 known petroglyphs in this complex have already been obliterated for the sake of such industrial developments (Bednarik, 2002).

It must be remembered that, in addition to direct destruction of rock art in the course of levelling the terrain prior to development industrial activity also has a remote impact on painted rocks in its neighbourhood, up to a distance of several tens of kilometres. The Egyptian site of Wadi Abu Subeira, an extensive group of carvings, some dating back to the Middle Palaeolithic, suffers not only from the extension of chalk and iron mining on the sides of the valley, but also because the constant traffic of lorries, carrying the minerals, causes vibrations that are dangerously detrimental to the integrity of the engraved surface of the rock (Storemyr, 2012).

In addition to expanding economical activity and its wake of pollution and potential destruction, military conflicts, such as occur frequently in certain parts of the world (Karamti & Girault 2017) -not to mention the increased destructive power of modern weaponry-, pose a growing threat to cultural heritage sites, whose preservation in wartime becomes secondary (Croissard, 2007).

Beside these various anthropic sources of deterioration of rock art, which may be described as side-effects of totally unrelated human activities, the patrimonial, symbolic or cultural dimension of rock art is, in itself, the reason for numerous attacks, some even considered wilful (Girault, 2017). In this context, military conflicts should be mentioned once again since, in a growing number of cases, the opponent's heritage has become a legitimate target, which one feels justified in wilfully defacing, destroying or even denying. In other cases, the very nature of the rock art (i.e. its iconic content) may invite its own destruction. For instance, throughout the Sahara region, where Islam is the prevailing religion, some sites, despite their being recognized as world heritage treasures under UNESCO, have already been vandalized or even obliterated, either because they testify to pre-Islamic times, a part of history which some would seek to deny altogether¹, or because certain subjects, particularly the human figure, are considered to be contrary to the rules of Islam. In the case of the rock art site of the "Enclos des Fiancés", on Morocco's Yagour Plateau, it is the depiction of sexual intercourse that led to its destruction.

Paradoxically, while such archaeological art can be described as "fossile art" (Clottes, 2002:4), meaning it is no longer carried on by the present-day descendants of the communities which created them, other local communities have incorporated the carvings into their mythological storytelling and ritual activity (Graff, et al., 2014). In turn, this may induce occasional surface destructions through new, superimposed engravings, or even more drastic destruction of the site through digging below the

¹As stated by the local expert, Abdelkhalek Lemjidi in a report to the Moroccan government. Quoted orally by Maxence Bailly

rock face for perceived hidden treasures.

Finally, one must also mention deteriorations originating in the “patrimonialization”² of archaeological sites and their subsequent operation and management. In the case of the upper Paleolithic rock paintings in the famous Altamira cave, which were the very first to be recognized as prehistoric art by late 19th century scientists. Deterioration was found, shortly after the opening of the cave to visitors in the 1960s. The fragile microclimate, essential to the preservation of the paintings in their original location, was already beginning to alter as a result of the flow of visitors and a CO₂-laden atmosphere. Subsequently, the curators of many painted caves across the south of Europe have felt it necessary to reduce the threats connected with human presence. In France, several approaches are presently being enforced. Certain sites, such as Font de Gaume and Les Combarelles (both in the Dordogne) are still open to the public, through certain adjustments and appropriate tourist management procedures. Others, including the Niaux cave (Ardèche) remain open only in part while certain galleries are closed to the public; furthermore caves such as Lascaux and the Chauvet cave have been placed under severe quarantine, with access totally denied to both tourists and researchers.

2 Accessibility: difficulties and restrictions

However, restricting access to rock art in order to preserve it, as curators have had to do in the latter cases, highlights a new category of constraints potentially affecting the future of rock art. As is the case with all monuments, archaeological rock art remains a non-entity until it is in actual contact with visitors and researchers.

As far back as the 1830s, following a *Note for the Preservation of the Monuments of Egypt* addressed by Jean-François Champollion to the Viceroy of Egypt, in which the author complained of “barbaric devastations” (Volait, 2010), a new ruling was introduced for the management of the archaeological heritage, not just as a scientific treasure but also as a vital future asset for the country (ibid). Indeed, archaeological tourism, which was for the first time sought out as an argument to support preservation, has subsequently become the largest single source of income of the country (Carabelli & Verdelli, 2007)³. However, not all rock art sites are able to elicit the full valuation and visibility which they deserve, and thus realize this economic potential for those countries and areas⁴.

One reason for this can be the difficulty of visiting a site. The rock art groups in Morocco’s Atlas Mountains, including the Yagour Plateau, a spectacular geological area harbouring some 3,000 Bronze Age engravings, are a prime example of the various hindrances, both geographical, topographical, as well as cultural difficulties, that can work against a site. Not only do the high altitude (above 6,000 feet) and the harsh climate with alternating heavy snowfall and periods of severe heat, make the area practicable for only 5 or 6 months of the year, according to one organization promoting treks to the High Atlas⁵. These sites are in a sparsely populated area, 80kms from Marrakech, the nearest urban and cultural centre for mass cultural

²By patrimonialization, as expressed in French, we mean the series of institutional processes by which a material or immaterial object becomes a heritage property, on any scale.

³That was true until the 2011 events that caused tourism revenue to plummet

⁴From International Charter on Cultural Tourism, adopted in 1999, 5.1, pp. 22

⁵See the website www.CyberBerbere.com (in french)

tourism and the starting point of treks, are poorly indicated by road signs and on maps, and lack the amenities essential to tourism. Nor, of course, are archaeologists, art historians and other researchers spared such difficulties. Further south in Morocco's Atlas Mountains, the Azrou Klane site, with over 400 engravings, is now the centre of a major interdisciplinary project, Geopark H2020 RISE⁶, aimed at cataloguing and documenting the archaeological heritage, and at educating the community on the importance of preservation. However, this remote area, where herding is still the main activity, suffers from the same environmental and climatic constraints along with a lack of accommodation and other facilities (Graff, 2014).

All too often, this is not the biggest problem facing tourism and field researchers. Political tensions of one kind or another can actually entail physical dangers. For example, access to the rock art complex at Laghchiwat, in southern Morocco (25kms from the Mauritanian border) with engraved scenes of undisputed interest and richness (Ewague et al., 2016), has for long remained quite dangerous for local researchers, and out of bounds for all foreigners, due to armed conflicts between Morocco and Frente Polisario over control of Western Sahara and its resources (Rodrigue, 2011). Even today, travelling to most parts of the Sahara region is “strongly advised against” for French nationals⁷; the unsafe zone includes not only Mauretania and Mali, but also Algeria, where Tassili n'Ajjer, one of the world's largest collections of prehistoric rock art once developed as a natural park, is now forbidden to tourists and researchers both foreign and local⁸.

3 A new consideration: isolation and neglect

In addition to the various risks pertaining to the natural environment and anthropic development around rock art sites, there is a new type of danger: that of isolation and neglect. All parties concerned with the archaeological heritage are caught in a vicious circle in which local touristic and heritage issues, circulation of information on international scale, *in situ* preservation and “patrimonialization” are closely linked.

In some countries, the “patrimonialization” process just does not work and those sites are jeopardized by the refusal of international organizations to extend the protection and value that come with such recognition. To return to Somaliland's Laas Geel rock art complex, which is currently facing potential destruction (Gutherz & Jallot, 2011), a “patrimonialization” project was submitted to UNESCO as far back as 2010, but to no avail since only countries partnered with the World Heritage Convention are eligible, which Somalia (whose sovereignty over Somaliland is only formal anyway) has failed to do, whilst Somaliland is not recognized as an independent country. This is one case where a site of obvious archaeological and natural interest is faced with neglect through improper stratification of “patrimonialization” procedures.

Yet even “patrimonialization” cannot always avert the risk of neglect. One example

⁶The European GEOPARK project (2014/2018), led by Yves Girault, aims to study in a comparative way (North/South) the “patrimonialization” processes (for natural and cultural heritage), in a context of international labeling by UNESCO. The objective is to question the notion of “geological heritage” according to the World Network of Geoparks, using empirical methodologies on heritage data and socio-economic development dynamics of territories through geo-tourism.

⁷From the French Ministry of Foreign Affairs website, “<https://www.diplomatie.gouv.fr/en/>” (21.03.2018)

⁸As stated by Malika Rachid, 2015, orally quoted by Gwenola Graff

of this is the Drakensberg rock art complex, on the border between South Africa and Lesotho. Despite having been granted World Heritage status by UNESCO, and sourcing revenue through responsible foreign tourism to finance management, operation and preservation activities (Smith & Duval, 2013), and although tourist accommodation is available (albeit still under way in part), the site, which at present attracts only one in ten tourists visiting this region (ibid), is in dire need of visibility, both locally and in tourist information centres etc., as well as through dedicated travel websites. Since tourism revenue is the main, or even sole, source of income for this site, this is detrimental to both the local communities involved in the responsible tourism scheme and for preservation activities, which require sizeable funding given its extent and its natural and cultural importance, which can only lead to further isolation.

The marginalization of such sites in the scientific world is no less worrying. The complete closure of certain areas of archaeological interest to scientists either local or foreign (as in the case of Algeria), and to the newest techniques and methods of research, is both a major hindrance to the advancement of science on a global scale and a threat for their preservation, whether they be known or as yet undiscovered. In the latter case, those areas will not benefit from the latest advances in archaeological exploration work through state-of-the-art technologies and up-to-date scientific expertise; if even duly discovered, operated and even “patrimonialized” rock art sites are still exposed to environmental and anthropic hazards, as we have learnt is indeed the case, prospects are even more dire for the undiscovered wealth of rock art of such restricted areas. As for those sites that are already known to science, the impossibility to acquire and publish fresh, up-to-date data is a significant blow dealt to the advancement of research, since technological and methodological progress constantly makes it possible to obtain ever better data and knowledge on parietal sites in their original surroundings. Moreover, those data are essential to model-making on a global scale; when such inaccessible sites are thus excluded from this process, this is not only a source of biases in scientific work, but will also push those sites out of the scope of science, which in the long-term can only lead to their neglect.