

The Archaeological Site of Banasa: Alteration Survey and Contribution for Enhancement

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Abstract: Banasa is one of the major archaeological sites of the Gharb plain; its components suffer from several alterations due to ageing building materials, lack of maintenance, and the influence of environmental conditions. The preservation of its remains and their enhancement, through the design of a Heritage Interpretation Center, constitutes one of the means of its efficient management. The objective of the present study is to identify the different types of deterioration that have affected the Banasa site. Our own observations have enabled us to elucidate and classify the effects of its degradation factors. The most important of these are the action of water, the instability of the terrain and living organisms such as superior plants and lichens. Our contribution to the development of Banasa is inscribed within the conception of a Heritage Interpretation Center based on the intrinsic values of the site.

Keywords: Banasa, Archaeological Site, Alterations, Enhancement, Heritage Interpretation Center.

Introduction

The Banasa site is one of the most important archaeological sites in the Gharb region. Located in the heart of the Gharb plain, some 17 km east of the town of Machraa bel Ksiri¹ (fig. 1), its remains dominate the left bank of the Oued Sebou, reflecting the memory of a glorious history.

The first identification of the ruins surrounding the Marabout of Sidi Ali Bou Jennoun with the ancient city of Banasa was made by C. Tissot in 1871 and confirmed by Henri de la Martinière in 1888.² Several excavation companies followed up on the site to uncover all the buried structures. The first excavations at Banasa uncovered the political center of the Octavian colony Iulia Valentia Banasa, residential quarters and five thermal establishments.³ The stratigraphic sequence of pre-Roman Banasa was established thanks to surveys undertaken by A. Luquet (1955-1956). The stratigraphic sequence of pre-Roman Banasa was established thanks to the test pits carried out by A. Luquet (1955-1956), which revealed levels predating the Roman city and characterized by the production of painted ceramics.⁴

1. Girard Sylvie, "Banasa préromaine. Un état de la question," *Antiquités africaines* 20 (1984): 12.

2. Rachid Arharbi and Lenoir Éliane, "Recherches archéologiques franco-marocaines à Banasa (Maroc)," *les nouvelles de l'archéologie* 124 (2011): 21.

3. Arharbi and Lenoir, "Recherches," 21.

4. Armand Luquet, "La découverte de la céramique peinte de Banasa," *Bulletin d'archéologie marocaine* 6 (1966): 483.

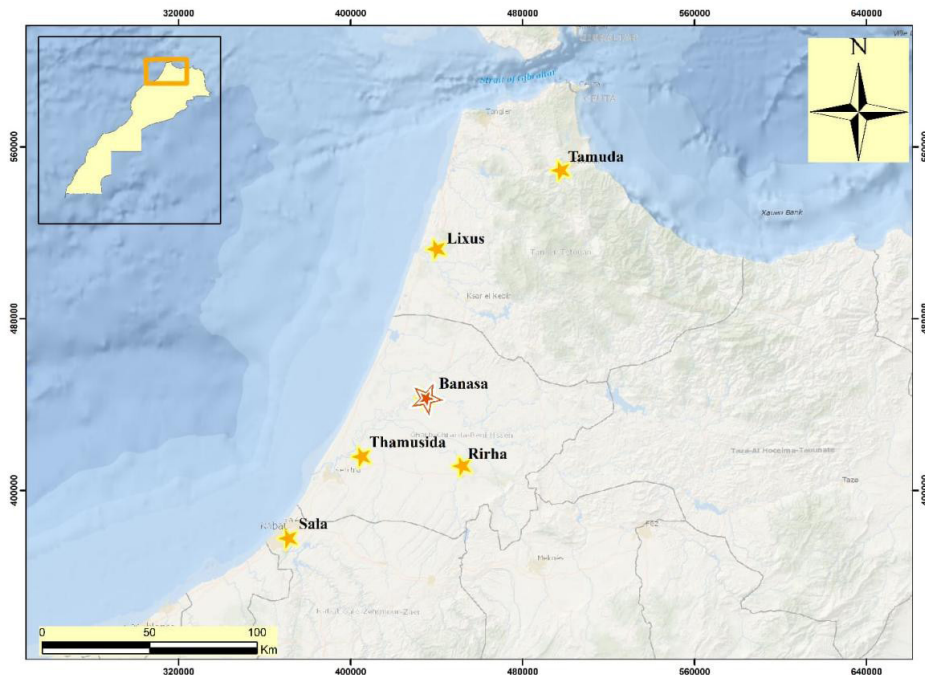


Fig. 1: Location map of the Banasa site

We currently have an outline of the history of occupation of the Banasa site, which is subdivided into three phases: the pre-Roman or Mauritanian phase, the Roman phase and the Islamic phase.⁵ For its historical, archaeological and cultural importance, Banasa was classified as a national heritage site by the “Dahir of June 18, 1930, classifying a protected area on the site of the ancient Roman town of Banasa, currently known as Sidi Ali Bou Jennoun.” As an essential component of our heritage, archaeological sites are seen as a territorial resource capable of contributing to the construction of nations.⁶ Indeed, just like a resource, archaeological heritage is the result of a construction that deserves to be preserved, valorized and transmitted to a wide public.⁷ Nevertheless, the archaeological site of Banasa is an open site; its structures are exposed to the weather, to biodegradation as well as to the action of man. In this study, we discuss the state of conservation of the Banasa site by defining the various factors of degradation and alteration, and then propose areas for interpretation, with a view to contributing to its enhancement.

In order to define the different aspects of alteration, we used a technique for this study that primarily focused on evaluating the condition of conservation of the structures at the Banasa site. The site has been explored and examined in detail, with a view to establishing a classification of alterations according to the nature of the disorders they cause. We then present the concept of a heritage interpretation center, as a means of managing and enhancing archaeological sites, before proposing ways of interpreting the

5. Arharbi and Lenoir, “Recherches,” 2.

6. Guillaume Marceau, Thomas Metzger and Nehme Azoury, “Gestion territoriale et valorisation du patrimoine: Vers un Développement régional durable,” *La Revue Gestion et Organisation* (2015): 53.

7. Marceau, Metzger and Azoury, “Gestion territoriale,” 53.

site to contribute to its enhancement. Interpretation of the remains of Banasa should be based on a communication strategy designed to convey messages linked to the history of the site and all the aspects that concern it, providing elements that can feed the cultural appetite of visitors.

1. Historical Context

The pre-Roman phase at Banasa has been confirmed by surveys carried out by A. Luquet.⁸ Several shards of painted ceramics produced on site in numerous potters' kilns were unearthed. The Roman occupation of the site is linked to the Roman colony Iulia Valentia Banasa, whose remains were excavated by Raymond Thouvenot,⁹ between 1933 and 1956. The Roman city of Banasa is protected by an urban wall and organized in an orthogonal grid around a forum lined with porticoes to the west and east, a basilica to the north and a temple with six *cellae*¹⁰ to the south. The Roman city contains several residential quarters, a macellum and five thermal baths. Recent excavations at the Banasa site, carried out between 2003 and 2008,¹¹ have uncovered an early Islamic phase, linked to an occupation that predates the construction of the marabouts and post-dates the Roman era.¹² Banasa's glorious past bears witness to the existence of Roman civilization in Mauritania Tingitana in general, and in the Gharb region (north-west Morocco) in particular.

2. Summary of Main Disorders

The assessment of the deterioration affecting the monuments on the Banasa site presented in this article was carried out using the terms defined in the ICOMOS¹³ which is an international French-English bilingual glossary, which distinguishes six major categories of deterioration into which just over seventy-five different morphologies are divided, each defined and illustrated by photographs of actual cases observed on buildings. The degradations have been listed and presented according to the large categories distinguished in the ICOMOS glossary; they range from simple chromatic alteration, such as black crusts that correspond to a coherent accumulation of gray to black, of materials whose thickness is perceptible to the naked eye, to more or less dense crossings when the accumulations result from a percolation process followed by precipitation. Other types of alteration are also listed, reflecting more advanced disorders, such as cracking, sandy disintegration (or loss of material), alveolization, which appears as cavities on the stone surface, gullying¹⁴ or linear erosion, which is due to the run-off of water transporting stone particles to create furrows, or biological

8. Armand Luquet, "La céramique préromaine de Banasa," *Bulletin d'archéologie marocaine* 5 (1964): 117-44.

9. Raymond Thouvenot, *Une colonie romaine de Maurétanie tingitane, Valentia Banasa*, Publications de l'Institut des Hautes Etudes Marocaine, 36 (Paris: Presses universitaires de France, 1941), 198-99.

10. Maurice Euzennat, "Banasa, colonia iulia Valentia Banasa, colonia Aurelia Banasa," *Encyclopédie berbère*, vol. IX, Aix-en-Provence (1991): 1325.

11. Arharbi and Lenoir, "Recherches," 22.

12. Arharbi and Lenoir, "Recherches," 22.

13. ICOMOS-ISCS, *Illustrated glossary on stone deterioration patterns* (2008), glossary available http://www.icomos.org/publications/monuments_and_sites/15/pdf/Monuments_and_Sites_15_ISCS_glossary_Stone.pdf

14. Ibtissam Toukmati, Abdelaziz Belfaïda and Rabia Hajila, "Contribution à l'étude des facteurs de dégradation du site archéologique de Banasa (Bassin du Gharb, Maroc NO)," *Oussour Al Jadida* 11, 1 (2021): 590.

colonization which applies mainly to plants and micro-organisms such as bacteria, cyanobacteria, algae, moulds and lichens.

All forms of water act to affect physical properties. Indeed, like all ancient buildings, the ruins of Banasa are permeable to rainwater infiltration and humidity. Capillary rise uses residual water in the soil as a weathering agent; wall bases show this behavior (fig. 1). When the soil is adequately moistened in the winter, capillary rise can be seen as efflorescences, salpest, or sand disintegration that results in degradations that mimic alveoli (fig. 2).



Fig. 2: Thermal bath wall with frescoes showing signs of capillary rise (Author's photo 11/10/2022)



Fig. 3: Intense alveolization (Variable shape and size cavities) (Author's photo 11/10/2023)

On the other hand, the Banasa site is located in an area where temperatures fluctuate sharply. Conditions are conducive to a freeze-thaw cycle. During the winter season, when temperatures can drop to a critical threshold of 7° , the water in the porous materials gradually turns to ice as its volume increases. The ice thus created in the pores of the stone begins to lose volume as the temperature rises, leaving behind micro-cracks and cracks (fig. 3) this is what is called the freezing cycle.¹⁵



Fig. 4: Vertical fissure crossing a wall in the large western baths (Author's photo 11/10/2022)

15. Philippe Bromblet, *Guide technique de conservation de la pierre* (Meknès: éd. Association MEDISTONE, 2010), 21.

2.1. Alterations Due to Ground Instability

The Gharb basin is known for the clayey nature of its sedimentary cover,¹⁶ which is in fact the result of sedimentation in quaternary environments of a silicoclastic nature due to countless inundations.¹⁷ The clayey nature of the soil supporting the site's structures is consequently at the root of Banasa's ground instability, and is a major factor in the physical degradation of construction materials.¹⁸ Indeed, clay swells as its water content increases, and shrinks and hardens as it dries.¹⁹ This alternation of humification and drought leads to differential settlement of the soil,²⁰ resulting in increased stresses on wall foundations and damage to elevations, which may even lead to the collapse of affected walls, via cracks (fig. 4) that crack partially standing walls.²¹

2.2. Alterations Due to Soil-Structure Interaction Phenomena

Building materials must be chemically altered, and liquid water – essentially water from meteors – must be involved. The motion of this water in the soil, mostly in the highest few centimeters of the surface, leads in substantial structural and mineralogical changes. Only well-ventilated stones that experience high rainfall and capillary rise will undergo this modification, triggering repeated inhibition/drying cycles.²²

The main disorders due to the chemical action of water appear either as chromatic alterations in the form of blackish encrustations (fig. 5), located in the wettest parts, or efflorescence, which are superficial saline crusts, resulting from the dissolution of salts and their arrival on the surface. The action of water also causes honeycomb-type alterations, particularly in areas exposed to rainwater, which is more or less acidified by atmospheric pollution, leading to hydrolysis of the minerals making up the building materials, and consequently a reduction in their internal cohesion. At the Banasa site, the action of water also causes sandy disintegration, which can be seen on most of the walls of the site's structures. This mechanism corresponds to the solubilization of the binder by chemical transformation, followed

16. See among others: Pierre Cirac, "Le bassin sud-rifain occidental au néogène supérieur: évolution de la dynamique sédimentaire et de la paléogéographie au cours d'une phase de comblement" (State thesis. Univ. Bordeaux 1, France, 1985), 283; Malika Kili, Bouabid El Mansouri, Jamal Chao and Abderrahman Ait Fora, "De nouveaux éléments structuraux du complexe aquifère profond du bassin du Rharb (Maroc): implications hydrogéologique," *C. R. Geoscience* 338 (2006): 1101; Mridekh Abelaziz, "Imagerie géophysique et évolution géodynamique récente de quelques bassins ouest marocains: potentiel hydrogéologique et pétrolier" (Habilitation thesis, Ibn Tofail University, Morocco, 2015).

17. Michel Combe, "Ressources en eau du Maroc. Plaines et bassins du Maroc Atlantique," *Notes et Mémoires, Service Géologique du Maroc* 2 (1975).

18. Toukmati, Belfaïda and Hajila, "Contribution," 592.

19. Jean-Pierre Magnan, Houssine Ejjaaouani, Vladimir Shakhirev and al, "Étude du gonflement et du retrait d'une argile," *Bulletin des Laboratoires des Ponts et Chaussées* 280-281 (2013): 155.

20. Magnan, Ejjaaouani, Shakhirev and al, "Étude du gonflement," 165.

21. Bromblet, *Guide technique*, 18.

22. Kévin Beck, Olivier Rozenbaum and Al-Mukhtar Muzahim, "Pierres des Monuments Historiques: Caractérisations et mécanismes d'altération du Tuffeau," in *Environnement, Sécurité, Patrimoine, Colloque de l'Association Française de Génie Civil (AFGC)*, (2003): 4.

by the migration of the salts formed towards the outer part of the stone.²³ The loss of binder leads to an increase in pore volume and a weakening of the material's mechanical properties, resulting in irregular hollowing.²⁴

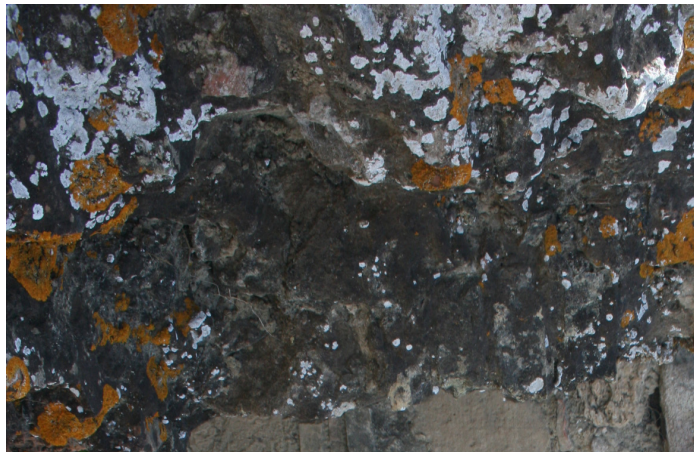


Fig. 5: Black crust chromatic alteration (Author's photo 11/10/2023)

2.3. Biological Alterations

Many living organisms can easily colonize stonework, making it unsightly and causing varying degrees of damage.²⁵ In fact, the micro-organisms responsible for biodegradation of the structures on the Banasa site can be divided into two groups: those that cause visible deposits to form, such as algae, fungi and lichens, and those that are more insidious, such as certain bacteria that cause decohesion of the material through their metabolic reactions, without forming visible deposits.²⁶ In Banasa, we were able to detect the presence of lichens which are the association of mushroom and algae (fig. 7-8), the whole forms a thalle.²⁷ These organisms cling to materials through their roots to form colorful coatings on wet surfaces.²⁸ The lichens exert both mechanical and chemical action, their roots penetrate the cracks and microcracks to increase their volumes and then once the medium is colonized, they emit organic acids capable of causing long-term superficial granular degradation of the stone.²⁹

23. Dalal Badreddine, Issam Aalil, Kévin Beck and al, "Préservation du site archéologique de Volubilis (Maroc): Caractérisation et étude des altérations des pierres principales du site," *Academic Journal of Civil Engineering* 35 (2017): 137.

24. Badreddine, Aalil, Beck and al, "Préservation," 137.

25. Toukmati, Belfaïda and Hajila, "Contribution," 595.

26. Bromblet, *Guide technique*, 12.

27. Toukmati, Belfaïda and Hajila, "Contribution," 595.

28. Toukmati, Belfaïda and Hajila, "Contribution," 595.

29. Toukmati, Belfaïda and Hajila, "Contribution," 595.



Fig. 7-8: Structures colonized by lichens
(Author's photo 11/10/2022)

In addition to micro-organisms, higher plants can also cause damage. In fact, herbaceous or climbing plants, trees and shrubs develop root systems on the site's structures, exploiting areas of weakness and exerting sufficient pressure to cause the widening of pre-existing cracks and the fragmentation of the stone that constitutes the main building material of the monuments on the Banasa site (figs. 9 and 10).³⁰ Vegetation also generates moist micro-soils that are a source of salts and the site of intense biological activity.³¹



Fig. 9-10: The upper plants that grace the frescoed thermal baths
(Author's photo 11/10/2022)

30. Toukmati, Belfaïda and Hajila, "Contribution," 595.

31. Bromblet, *Guide technique*, 15.

Besides of naturally occurring variables contributing to the declining state of the Banasa archeological site, human endeavors in all their manifestations have occasionally caused detrimental impacts on the edifices.

The site conservancy has had to install a fence around the Banasa protection zone, but local residents continue to use the site as a daily passageway. In fact, the trampling of archaeological structures weakened by time is causing irreversible demolitions and upheavals in the site's construction techniques. Banasa is surrounded by three marabouts that can still be visited today (fig. 11). The moussems of these marabouts have been definitively halted, but visitors continue to access them, unaware of the site's importance and causing damage unintentionally and unconsciously.



Fig. 11: One of the three marabouts inside Banasa. (Author's photo 11/10/2022)

3. A Heritage Interpretation Center for the Archaeological Site of Banasa

Following our presentation of all of the variables of degradation affecting the current state of conservation of the Banasa archaeological site's structures – which we discussed in the introduction – we are currently providing a proposal for improving the site using a medium that is widely acknowledged for being extremely effective at presenting heritage: the Heritage Interpretation Center.

3.1. Theoretical Basis

The decision of what to do for fun these days often includes visiting historical landmarks. Heritage interpretation appears to be a lever employed today to address issues with territorial and tourism dynamism, serving as a tool for interpreting the territory in a different light.³² The concept of heritage interpretation, theorized by Freeman Tilden in the 1950s in the United States,

³². Bromblet, *Guide technique*, 15.

concerned only natural heritage, linked to the history of American national parks,³³ then evolved in space and time.³⁴ At first, interpretation practices were mainly applied to protected areas, the aim being to convey a message of protection and preservation of natural spaces. In recent years, however, the tool has become more widely used: the primary objective of environmental protection has been joined by the desire to showcase heritage.

Morocco, aware of the importance of its archaeological sites, and of the importance of transmitting heritage to the public, has in recent years adopted a new approach based on the notion of “interpretation,” which draws on all the resources of the imagination and all the techniques of animation to put the visitor in a situation, bringing him to realize that he is personally concerned by this heritage.

3.2. Interpretation of the Banasa Site

As in the case of the most innovative interpretation centers, it’s best to opt for an overarching theme that serves as a general guideline.³⁵ In the case of Banasa, the aim is to highlight the contacts, cross-fertilizations and continuities between past and present, by following all the historical phases of the site’s occupation.

The public who visits the Banasa site do not necessarily share the same goals; some visitors are content with a simple tourist stroll, while others seek to acquire as much information as possible. To meet these different expectations, we analyzed the history of the site and its component parts, and then looked at the different areas of interpretation.

- **Ancient Banasa: A Source of Cultural Contacts**

The aim of this axis would be to resume the course of the history of the Banasa site through its different stages, its ruptures, its continuities and its transformations. The aim is to highlight the chronological evolution of the site from prehistory to Muslim occupation. In addition, the mediation choices made are based on the audio-guide, a tool recognized for its pedagogical value.

The chronological evolution of the Banasa site can be presented to the public using a timeline, which summarizes the site’s history from prehistoric times to the Islamic period, highlighting the most significant events in the city’s history.

In order to bring visitors as close as possible to the history of Banasa, it would be advisable to create a slide show that links each period of occupation of the site to the corresponding archaeological material. This mediation tool is used when archaeological material is unavailable or difficult to bring back to the site. Canadian museums and

33. Odile Bousquet, *Centre d’interprétation de l’architecture et du patrimoine, mode d’emploi* (Combourg: Ministère de la Culture et de la Communication, Direction de l’Architecture et du Patrimoine, 2007), 12.

34. Hélène Durand, “Interprétation du patrimoine et développement territorial” (diploma thesis, Université Joseph Fourier, Grenoble, 2015), 9.

35. Martine Thomas Bourgneuf, “Questions méthodologiques autour de la conception des centres d’interprétation,” *La Lettre de l’OCIM* 98 (2005): 15.

interpretation centers often use this form of mediation, which is appreciated by the public and proves pedagogically satisfying.³⁶ The slide show would be accompanied by a narration via audioguide, introducing visitors to each archaeological object.

- **Banasa: Art and Architecture**

This section focuses on remains dating from the imperial period. The first section sets out the geographical and political framework of Roman times in Tingitanean Mauritania, with a map showing the main towns, the regional divisions into provinces and the borders of the empire and the main roads.³⁷ This map places visitors in the geopolitical context of the Roman occupation of Mauritania Tingitana. In addition, a chronology of Roman history, including the main emperors, would be explained in the form of a virtual frieze, which scrolls across a screen. This frieze would be complemented by a simple, precise audio guide.

A second section would be dedicated to urban planning and architecture as a symbol of Romanity. The city's main monuments: the forum, basilica, temple, public baths, houses and Macellum could be presented in the form of models, drawings and plans on fixed boards or virtual 3D images. Each building could be the subject of a model or a plate, each with a mini floor plan to situate it on the site.

Architectural elements such as shafts, column bases, columns and epigraphic documents could be displayed in an appropriate scenography, to emphasize the architectural richness of the imperial city.

To showcase the artistic achievements of Banasa, a slide show could be set up to display photos of the mosaics and murals found in the city's buildings. If displaying the mosaic paintings proves difficult or impossible, it is advisable to reconstitute them in real mosaic tesserae and hang them directly on the wall (fig: 10). A video would accompany the presentation, explaining the techniques used by Roman craftsmen. A map locating each mosaic painting in the monument to which it belongs would serve as a guide for visitors.

36. Winnipeg's Manitoba Museum uses slide shows evoking First Nations from prehistory to the 19th century. These dioramas can be viewed on the institution's website <http://www.manitobamuseum.ca/main>

37. General cartographic information on Mauritania Tingitana can be found in the following doctoral thesis: Abdellatif Rhorfi, "Histoire préromaine et romanisation de la Maurétanie tingitane avant son annexion à l'Empire romain" (Doctoral thesis in History, Paris-Sorbonne University, 2000).



Fig. 10: Mosaic on display in the Lixus CIP (Photo provided by the site conservator)

- **Banasa: Society and Religion**

Banasa's third axis of interpretation is focused on religious life, which would be addressed through a presentation of the main gods of the Roman pantheon, notably those of the capitoline triad (fig. 11).³⁸ We could use a hologram³⁹ as an innovative mediation tool to present 3D images of the deities, as well as a restitution of the Roman capitol. This new technology would enable visitors to better appreciate the majesty of this religious edifice. This presentation could be based on the statues preserved in the Museum of History and Civilization (fig. 11) or on photos of these gods, not necessarily from the Banasa excavations. Armed with this basic information, a slide show displaying photos of the Banasa gods would scroll across a screen, with each god linked to his or her cult and representation on the site. Epigraphic documents, statues and mosaics could also be displayed, or we could rely on copies or casts.

38. In Roman religion, the Capitoline Triad refers to the three deities Jupiter, Juno and Minerva, who were honored at the Temple of Jupiter on the Capitoline Hill. A statue of Jupiter was unearthed during excavations in the southern district of Banasa.

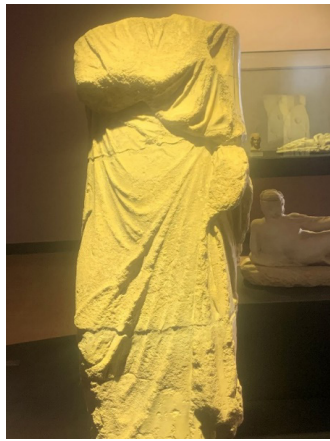
39. The Tautavel prehistory museum in France is using this new technology to bring virtual reality to visitors. These virtual reconstructions are available on the institution's website <http://www.450000ans.com>



Fig. 11: Head of the goddess Juno exhumed in Banasa, on show at the Rabat Museum of History and Civilization (Author's photo 20/01/2023)

An evocation of the cult of the emperor through the few dedications discovered in situ, would show that this was practised on the Banasa site. The dedications are either originals or copies.

The interpretation of Banasa's social history is based on portraits of characters such as amici and decurions. Epigraphic sources such as the military diploma delivered by Emperor Domitian to the cavalier Domitius, the Edict of Caracalla, the tables of patronates, and the statue of the draped woman exhibited in the Museum of History and Civilization in Rabat (fig. 12), would serve as support for this section. Unless these archaeological finds are exposed in the Heritage Interpretation Center of the Banasa, they could be mentioned in the narration of the audio guide. The latter would be devoted to explaining the role of the decurions in the city, with a few amici taking the floor to explain their political and economic role in the city, their gifts to the city and their leisure activities. Their function in the curia, their leisure time in the baths, their discussions in the forum could be recreated to transport visitors into their world and familiarize them with the life of this elite.



Statue of draped women in marble



Bronze military diploma

Fig. 12: Archaeological testimonies of social life in Banasa, on show at the Rabat Museum of History and Civilization (Author's photo 20/01/2023)

- **Banasa: The Economy**

The last axis of interpretation at Banasa concerns economic activity, encompassing agriculture, trade and handicrafts.⁴⁰ Concerning agriculture, texts and archaeological evidence attest to the importance of wheat production at Banasa. To highlight this activity, the millstones discovered on the site during the excavations should be displayed (fig. 13), with an audio-guided narration to give visitors as much information as possible on the materials used to make these millstones, as well as how they were used and whether they were intended for domestic or communal use. With this basic information in hand, a map showing the distribution of these millstones around the site would be displayed as a panel, with a coloured indication of the location of the millstones discovered during the excavations.

To bring the visitor closer to the Roman bread-making process, images should be displayed on a screen, accompanied by a narration explaining the steps from depositing the wheat in the mill to baking the bread. A reconstruction of a Roman oven would serve as a means of mediating this type of activity, as has been done at the Gallo-Roman Museum of St. Roman in Gaul in Vienna.

The second section of the theme relating to Banasa's commercial function would focus on artisanal activities. First, the importance of ceramics production in Banasa would be demonstrated. Ceramics discovered on the site during the excavations would be displayed in showcases, this time with an animated slide-show-style background evoking the work of craftsmen in workshops dedicated to ceramics production (fig. 14). The commentary on the audio guide would emphasize the importance of this industry in Banasa's economic life. The narration would also evoke the kilns dedicated to firing ceramics that were discovered on the site during the excavations.

40. Sidi Mohamed Alaioud, "L'économie de Banasa à l'époque provinciale," *l'Africa romana*, Atti del XV convegno di studio Tozeur, 11-15 dicembre, vol. III (Roma: Carocci editore, 2002), 1899.

Carved decorative elements such as capitals, shafts and column bases, would serve as mediators to highlight the artisanal activity of sculpture, and would be ideal for display in the CIP. The audio-guide would point out that to date we have no data on whether these decorative elements were imported already worked or in the form of rough blocks.

The final section of Banasa's commercial function would concern trade, and it's worth pointing out that, in addition to the land route, the Sebou River was a means of internal and external communication, and played a key role in Banasa's commercial exchanges. A large panel depicting the river with trade boats will highlight its role. The aim of this section is to show the privileged trade relations with Betica, Gaul and, to a lesser extent, Italy. Amphorae used to contain wine, oil or garum from Betica, cured meats imported from the Iberian Peninsula, ceramics and sigillated tableware made by Iberian ateliers, will be displayed in showcases with a screen showing slide shows evoking maritime trade using boats sailing on the river. The idea is to show the continued predominance of the Iberian Peninsula in trade transactions with Banasa until the third century. The commentary on the audio guide would emphasize the products being sold, and the background music would feature the cry of seagulls, to match the ships illustrating maritime trade.

4. Synthesis and Discussion

Based on the history and archaeological components of Banasa, we have defined the main factors governing the alteration of these historic buildings. These factors are those likely to induce and promote physical or chemical modifications in the site's structures. These factors may be related to the nature of the building materials used, in which case they are intrinsic, or linked to the parameters of the surrounding regional or local environment and influence their state of conservation, and be considered extrinsic factors. These factors are usually the parameters prevailing around the site, humidity, rainwater, temperature variations, the impact of vegetation and also the action of man.

The visual observations and the expertise analysis of the site, allow us to identify the probable factors and processes causing the deterioration of building materials. Cracking and tilting of walls, often linked to lack of maintenance and restoration work, are the most frequent manifestations at Banasa. Similar observations were made at the Volubilis site (north-west Morocco) by Dalal Badreddin, who also drew on the illustrated glossary of stone alteration figures produced by ICOMOS, to give a description of the degradations affecting the state of conservation of the site's monuments.⁴¹

At Banasa, the role played by the action of water is undeniable, causing accelerated degradation of the stone used on the site; variations in the intensity of this type of weathering are controlled by the degree of direct exposure to rainfall.

41. Dalal, Aalil, Beck and al, "Préservation," 136.

The implication of the impact of plants, also known as biodegradation, is obvious; they develop roots on the structures of the site, which exert significant pressure capable of widening cracks and causing fragmentation of the stone; a study carried out on the impact of the development of flora on the state of conservation of the Volubilis site, indicates the same types of alterations caused by plants in the structures of the Banasa site.⁴²

The second part of this article sets out a proposal to enhance Banasa through the creation of a heritage interpretation centre, this institution that will allow the site to benefit from a considerable promotion work, not by the heritage object namely the archaeological material exhumed during the excavations, but rather from the visitor point of view of which the interpretation center is part.

Our proposal, which aims to develop a scenario through interpretation axes, has been inspired by several examples from around the world, including the interpretation center at ELUSA, the ancient capital of France. After several years of excavation, the site was enhanced by the creation of a CIP, which complements the visit to the site and provides an excellent starting point for understanding the history of the three sites that make up the “ELUSA Ancient Capital” complex. Through a modern and innovative scenography, it offers several interactive tools to allow visitors to live the emotion of the ancient experience. By developing a scenography adapted to the proposed interpretation axes, the Banasa heritage interpretation center will be an added value for Moroccan archaeological sites, as it will join the CIP of the Volubilis archaeological site and the CIP of the Lixus archaeological site.

Conclusion

The study of alterations relating to the archaeological site of Banasa allowed us to define the main factors governing the degradation of its building materials. These factors are likely to modify both the internal and external appearance of the stone used to build the site’s components. These factors may be linked to the nature of the rock used, in which case they are intrinsic, or they may be linked to the parameters of the surrounding local or regional environment and influence its state of conservation, in which case they are considered extrinsic factors.

In Banasa, damage caused by rainwater or subterranean water is predominant, causing various degrees of severity: cracking, disintegration, honeycombing, blackening and efflorescence. The action of water can also be very serious, causing irreversible damage such as tilting or toppling of walls. Heritage interpretation is an effective way of enhancing archaeological sites, creating a relationship between the elements of a heritage site or collection on the one hand, and the visitor’s search for meaning and framework of values, on the other. It also creates cognitive and emotional links between visitors and what they can discover in a nature park, historic site or museum.

42. Aomar Dabghi, Najib Magri, Khalid Achoual and al, “Floristic diversity and its biodeteriogenic effect on the archeological site of Volubilis (Morocco),” *Plant Cell Biotechnology and Molecular Biology* 22 (2021): 53-70.

The creation of a CIP for the Banasa site will enable its integration into the regional development process. The importance of Banasa's history, the archaeological material unearthed during the excavations and its specific architectural features make it a site that deserves to be presented in an attractive way to the public, and the creation of this new institution will enrich Moroccan repertoire of heritage interpretation centers.

Bibliography

- Alaioud, Sidi Mohamed. "L'économie de Banasa à l'époque provinciale." In *l'Africa romana*, Atti del XV convegno di studio Tozeur, 11-15 dicembre, vol. III, 1899-1911. Roma: 2002.
- Arharbi, Rachid and Lenoir Éliane. "Recherches archéologiques franco-marocaines à Banasa (Maroc)." *Les nouvelles de l'archéologie* 124 (2011): 21-24.
- Badreddine, Dalal, Aalil Issam Beck. kévin and al. "Préservation du site archéologique de Volubilis (Maroc): Caractérisation et étude des altérations des pierres principales du site." *Academic Journal of Civil Engineering* 35 (2017): 134-37.
- Beck, Kévin, Olivier Rozenbaum and Muzahim Al-Mukhtar. "Pierre des monuments historiques: Caractérisations et mécanismes d'altération du Tuffeau." *French Civil. Engineering Association* (2003): 1-16.
- Bourgneuf, Martine Thomas. "Questions méthodologiques autour de la conception des centres d'interprétation." *La Lettre de l'OCIM* 98 (2005): 13-20.
- Bousquet, Odile. *Centre d'interprétation de l'architecture et du patrimoine, mode d'emploi*. Combourg: Ministère de la Culture et de la Communication, Direction de l'Architecture et du Patrimoine, 2007.
- Bromblet, Philippe. *Guide technique de conservation de la pierre*. Meknès: éd Association Medistone, 2010.
- Cirac, pierre. "Le bassin sud-rifain occidental au néogène supérieur: évolution de la dynamique sédimentaire et de la paléogéographie au cours d'une phase de comblement." State thesis. Univ. Bordeaux 1, France, 1985.
- Combe, Michel. "Ressources en eau du Maroc. Plaines et bassins du Maroc Atlantique." *Notes et Mémoires, Service Géologique du Maroc*, Tome 2, 1975.
- Durand, Hélène. "Interprétation du patrimoine et développement territorial." Diploma thesis, Université Joseph Fourier, Grenoble, 2015.
- Euzennat, Maurice. "Banasa, colonia iulia Vanlentic Banasa, colonia Aurelia Banasa." *Encyclopédie berbère*, vol. IX (1991): 1323-28.
- Girard, Sylvie. "Banasa préromaine. Un état de la question." *Antiquités africaines* 20 (1984): 11-93.
- ICOMOS-ISCS. *Illustrated glossary on stone deterioration patterns* (2008), [Online]: http://www.icomos.org/publications/monuments_and_sites/15/pdf/Monuments_and_Sites_15_ISCS_lossary_Stone.pdf
- Luquet, Armand. "La découverte de la céramique peinte de Banasa." *Bulletin d'archéologie marocaine* 6 (1966): 483-86.
- _____. "La céramique préromaine de Banasa." *Bulletin d'archéologie marocaine* 5 (1964): 117-44.
- Magnan, Jean-Pierre, Ejjaaouani Houssine, Shakhirev Vladimir and al. "Étude du gonflement et du retrait d'une argile." *Bulletin des Laboratoires des Ponts et Chaussées* 280-281 (2013): 155-70.
- Malika, Kili, Bouabid El Mansouri, Jamal Chao and Abderrahman Ait Fora. "De nouveaux éléments structuraux du complexe aquifère profond du bassin du Rharb (Maroc): implications hydrogéologique." *C. R. Geoscience* 338 (2006): 1194-202.

- Marceau, Guillaume, Metzger Thomas and Azoury Nehme. "Gestion territoriale et valorisation du patrimoine: Vers un Développement régional durable." *La Revue Gestion et Organisation* (2015): 44-56.
- Mridekh, Abelaziz. "Imagerie géophysique et évolution géodynamique récente de quelques bassins ouest marocains: potentiel hydrogéologique et pétrolier." Habilitation thesis. Ibn Tofail University, Morocco, 2015.
- Rhorfi, Abdellatif. "Histoire préromaine et romanisation de la Maurétanie tingitane avant son annexion à l'Empire romain." Doctoral thesis in History, Paris-Sorbonne University, 2000.
- Thouvenot, Raymond. *Une colonie romaine de Maurétanie tingitane, Valentia Banasa*. Publications de l'Institut des hautes études marocaine, 36. Paris: Presses universitaires de France, 1941.
- Toukmati, Ibtissam, Belfaïda Abdelaziz and Hajila Rabia. "Le centre d'interprétation du patrimoine, un outil de mise en valeur des sites archéologiques: Cas du site archéologique de Banasa (Bassin du Gharb, Maroc NO)." *OUSSOUR Al Jadida* 12, 1 (2022): 565-89.
- _____. "Contribution à l'étude des facteurs de dégradation du site archéologique de Banasa (Bassin du Gharb, Maroc NO)." *OUSSOUR Al Jadida* 11, 1 (2021): 584-605.
- Zaoui, Nouhad, El Wartiti Mohamed, Nahraoui Fatima Zahra and Dabi Sana. "Etude de l'altération de la calcarénite des monuments de Rabat: influence de la pollution atmosphérique et des aérosols marins." publié par EDP sciences, 2014. [Online]: https://www.researchgate.net/publication/275310836_Etude_de_l%27alt%C3%A9ration_de_la_calcar%C3%A9nite_des_monuments_de_Rabat_Influence_de_la_Pollution_Atmosph%C3%A9rique_et_des_A%C3%A9rosols_Marins.

العنوان: موقع بناصا الأثري، جرد مظاهر التآكل وإسهام في رد الاعتبار.

الملخص: يعتبر موقع بناصا، من أهم المواقع الأثرية الموجودة بسهل الغرب. وتعاني بقايا المباني الأثرية لهذا الموقع من التأثيرات السلبية الناتجة عن عوامل التآكل، وذلك راجع بالأساس إلى تقادم مواد البناء، وضعف حملات الصيانة وكذا إلى تأثير العوامل المناخية والبيئية.

تعد مراكز تعرف التراث، من بين الوسائل الفعالة التي تسهم بشكل مباشر وكبير في ترميم المواقع الأثرية، ورد الاعتبار إليها. وتهدف هذه الدراسة إلى جرد مختلف عوامل التآكل بموقع بناصا، وتسليط الضوء على الآثار السلبية التي تخلفها على بقايا بناياته الأثرية، مثل تأثير المياه سواء منها السطحية أو الجوفية، وطبيعة الأرضية التي شيد عليها الموقع، وأيضاً تأثير الكائنات الحية خصوصاً منها النباتات.

وللإسهام في ترميم هذا الموقع لأثري المهم ورد الاعتبار إليه، أقدم في دراستي هذه مجموعة من المحاور التي يمكن أن تشكل البنية المركزية لتفسير التراث باعتباره مشروعاً قد يسهم في التعريف بناصا، وذلك بالاعتماد على القيم الجوهرية التي يتميز بها هذا الموقع.

الكلمات المفتاحية: بناصا، موقع أثري، مظاهر التآكل، ترميم، مركزية تأويل التراث.

Titre: Le site archéologique de Banasa: Relevé des altérations et contribution à sa mise en valeur.

Résumé: Banasa est l'un des sites archéologiques majeurs de la plaine du Gharb, ses composantes souffrent de plusieurs altérations dues au vieillissement des matériaux de construction, au manque d'entretien et aussi à l'influence des conditions environnementales. La préservation de ses vestiges et leur mise en valeur via la conception d'un centre d'interprétation du Patrimoine (CIP), constitue un des moyens de sa gestion efficiente.

Le présent travail a pour objectif de répertorier les différents types d'altérations ayant affectés le site de Banasa. Nos propres observations nous ont permis d'élucider et de classer les effets de ses facteurs de dégradation. Les plus importants sont l'action de l'eau, l'instabilité du terrain et les organismes vivants tel que les végétaux supérieurs et les lichens. Notre contribution dans le processus de mise en valeur de Banasa, s'appuie sur la conception d'un CIP en se basant sur les valeurs intrinsèques du site.

Mots-clés: Banasa, site archéologique, altérations, mise en valeur, CIP.