

# Exploration and preservation of Petra

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**Abstract:** Petra is a famous ancient city in Jordan. It was in ancient times the communication fortress among the Arab countries. Nowadays it is one of the most famous archaeological sites in the world. It was declared a world heritage site by UNESCO (United Nations Educational, Scientific, and Cultural Organization) in 1985. The historical and the cultural values of the city are briefly elaborated. The locality plans to the culture site protections are introduced, especially the restoration of the Great Temple, which gives us an opportunity to comprehend the protection of ancient cities in different countries. The Jordanian government has taken very seriously their commitment to preserving this valuable historical site, which is considered by many Jordanians to be a priceless national treasure. One would assume that a gradual reversal, from neglect to serious efforts of preserving the site and its beauty, would have taken place.

**Key words:** urban revitalization; conservation; preservation

## 1 Ancient City of Petra

Petra, south of Jordan, the capital of the Nabataean Kingdom and a Roman city after 106 AD, is situated on a high plateau cut by many deep gorges (see Fig. 1<sup>[1]</sup>). The signs of decay on the monuments of Petra, that are cut out from the living rock are numerous and alarming. Today 800 tomb facades are listed. Once, more than 2 000 facades lined the slopes of the steep mountains. We can estimate that more than 80% of the elaborately chiseled and decorated facades have been lost forever. Since the days when the Nabataeans left Petra for good, all the buildings of the town have decayed and the rock monuments were reintegrated into the cycle of nature and left unprotected from the forces of erosion and dilapidation. Thus, it does not come as a surprise that only a few of them, though battered, have almost miraculously survived this assault. All this clearly indicates that the major underlying reason for the evident and still ongoing decay of the monuments is neglect, a neglect that continues to the present<sup>[2]</sup>.

The few and surely honorable attempts that have been made to save parts of some of the monuments, e. g. at al-Khazna (the Treasury) and the Palace Tomb, were actually failures. They were well-intended efforts in their time, but now we know that they were futile and in fact, in the long run, may have been more harmful to the monuments than if nothing had

been done at all. It is above all because of the repeated and excessive use of Portland cement with its entirely different properties that forms an incompatible mix with the sandstone from which the tombs are carved. This is extremely detrimental to the monuments and for many other reasons cement should have no place in Petra<sup>[3]</sup>.



Fig. 1 Map of Jordan showing Petra

The ancient Nabataean city of Petra has always been the prime tourist spot of the country that has attracted travelers from all over the world because of its unique architecture, meaning the peculiar way in which the facades were shaped and its outstanding setting and beauty. Due to its great cultural significance for humanity, it has been recognized as a world heritage property.

A boom in hotel construction was begun in 1994. Roads were also built and widened and world-wide promotional activities for tourism to Jordan were launched. However, there was not much visible effort

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to conserve the cultural heritage. A hopeful new attempt for conservation is the German-Jordanian project for the establishment of a conservation centre in Petra. Its first project, the restoration of the Tomb of the Fourteen Graves (Tomb 825), has been implemented and special guidelines and procedures for the restoration of the monuments as well as their documentation have been developed<sup>[4]</sup>.

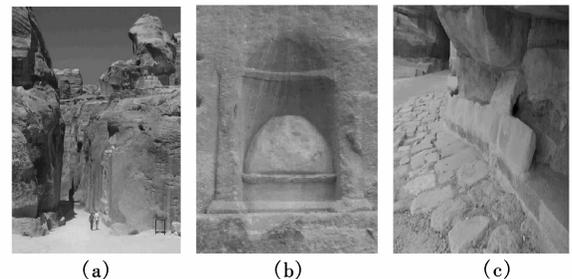
Petra, however, has become one of the favorite destinations of tourists visiting Jordan and the Holy Land and ad hoc restoration work is no longer enough. The nature and complexity of the problems arising were considered to be sufficiently important for UNESCO to give further consideration to Jordanian concerning about the site. It was evident that Petra, the ancient capital of the Nabataeans, was facing inevitable further deterioration if an overall safe-guarding plan were not rapidly set in motion<sup>[5]</sup>.

In December 1991, a mission was sent to Jordan to identify the problems and to suggest projects to remedy them. This was followed by the dispatch of a multidisciplinary group of experts which stayed in Petra from October 24th to November 24th, 1992. This mission consisted of an architect/coordinator, a town-planner with specialist knowledge of problems of Saharan hydrology, an expert in ecology and the management of national parks, and geomorphologies, two experts on cultural tourism and touristy engineering, an anthropologist and an archaeologist with specialized knowledge of Petra. Following completion of their mission, the members of the UNESCO team were received by their Majesties King Hussein of Jordan and Queen Noor to whom they presented the broad lines of action they proposed for the elaboration of a master plan covering the whole Petra region. Details of the analysis made and conclusions reached by the experts were laid out in a two-hundred-page report which was sent to UNESCO for reproduction in April 1993.

Like all the visitors, the experts saw Petra as an archaeologically fascinating city, unique both in its geographical location and in the quality of its natural environment. Inhabited since Neolithic times, Petra entered its golden age when the Nabataeans chose this site to be the royal seat of King Aretas in the second century BC. From that time onwards, for several centuries, Petra played a dominant role, flourishing as an economic and religious centre and as a sacred funerary city.

Scattered around the city are hundreds of tombs and funerary vaults, carved out of the rock and adorned

with sculptures. The city also has its share of civic buildings since it was once a major cross-road for the caravan routes that led to Sinai, the Red Sea, the Dead Sea, Egypt and Syria. The climate, which appears to have changed little since ancient times, impelled the inhabitants to construct ingenious systems, veritable works of art, to control the water that nature dispensed with a parsimonious hand. Annual precipitation in the area averages between 50 and 250 millimeters a year, an amount characteristic of semi-desert regions. These climatological conditions, combined with the abandonment of the ancient system of dams and irrigation channels has been one of the causes of erosion of the soil and of the amplitude of the flooding when the area is at times subjected to torrential rain. Access to the site of Petra is through the narrow, two-kilometer-long Siq Gorge (see Fig. 2).



**Fig. 2** Walls of the Siq. (a) The Siq leads to the Treasury; (b) Small niches; (c) Along the left side of the Siq, a covered water channel

The monuments of Petra are under several forms of attack, not least from erosion by the wind which carries sand particles from the crumbling sandstone rock and which corrodes the lower sections of the facades of the tombs and funerary vaults, the water which infiltrates into the rock by capillary action and enables vegetation to grow in the interstices cause fracturing of the rock or even the rock to fall. Nature, however, is not the only aggressor. Human activity also plays a preponderant role in the deterioration of the site. The integrity and conservation of the site are seriously threatened by the uncontrolled flow of tourists and the lucrative sideline activities this engenders.

The first thing that strikes the visitor on arrival at Wadi Musa, a village through which one passes to reach the archaeological site, is the clear evidence of uncontrolled urban development. Large numbers of hotels have sprung up, one of them located within an area that should be designated as a “no building” zone. Recent archaeological research shows that many vestiges of the ancient site have still to be uncovered in the area stretching from the existing site up to and including parts of the village of Wadi Musa, which, because of

the tourist influx, is rapidly developing into a bustling small town. One of the most lucrative activities is the provision of horse and camel rides to give tourists access to the ancient ruins. Exotic and attractive as this may seem to tourists, the dust raised by the animals becomes encrusted on the flanks of the Siq Gorge and damages the excavated ruins.

On emerging from the Siq Gorge and reaching the archaeological site itself, the visitor finds the path strewn with stalls selling tourist souvenirs. The vast number of these rudimentary, temporary stalls seriously disturbs the harmony of the site. Moreover, the pitches are shared out among various tribes living in the area and any re-allocation would have to be equitable. This is why the master plan envisages a long-term strategy aimed at involving the local population authorities to be concerned very closely with an elaboration of a management plan the site.

An initial solution could be the creation of a National Park within which zones would be selected for specific purposes. The National Park would be administered by a body having sufficiently broad responsibility management autonomy to enable it to resolve the special problems peculiar to Petra. As one comes to the end of the Siq, the first and the greatest monument of Petra slowly comes into view (see Fig. 3<sup>[1]</sup>). This is the famous Treasury monument. Along the walls of the Siq are many small niches containing block gods of various kinds, Fig. 2(b)<sup>[6]</sup>.



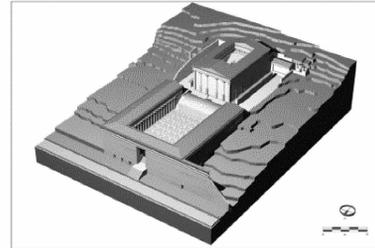
Fig. 3 Main face of Petra (the Treasury)

## 2 Consolidation and Site Protection

There have been more than one project taken to protect the site. The following are steps that have been taken to protect the Great Temple project.

The project at the Great Temple adheres to the Charter of Venice. Firmly believing in minimum inter-

vention, the reversibility of any chemicals and materials used in consolidation, and the use of new stone which is discernible from the ancient ashlars, exercising great care, the project uses modern technology (virtual reality exploration), straps, cranes and front loaders (see Fig. 4).

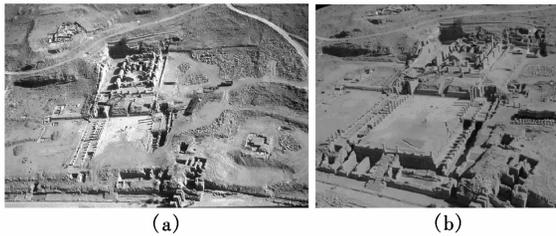


The Petra Great Temple Reconstruction  
Brown University Excavation

Phase VII

Fig. 4 Reconstruction of the temple

Archaeological investigations of ancient structures of any kind are important in increasing our knowledge of the past; however, they also produce serious side effects by exposing structures to the elements and vastly increasing the rate of decay. In order to slow this process, we have employed certain measures simultaneously with the excavation. With this in mind, a preliminary conservation survey of the excavated portions of the Temple, at present, has been carried out with a view to preserving and restoring various architectural features. From the beginning, the fundamental philosophy of the Great Temple excavations has been the consolidation of the site and the re-erection of columns while the excavations are in progress. Exposure of the architectural features has been of serious concern, since the site is susceptible to erosive heavy rains and earth tremors. This was acknowledged by the incorporation of several additional consolidation procedures which have become part of our research design. An application was made to the World Monuments Fund which granted an award expressly for site preservation, conservation and consolidation. The Great Temple Consolidation Project was made possible in part by a grant from the Samuel H. Kress Foundation through World Monuments Watch, a program of the World Monuments Fund. Briefly described, budget constraints forced us to be selective in what we could undertake. While portable artifacts were photographed on site, architectural components were removed to the lapidary to the west of the site, after these artifacts had been fully documented. The artifacts for the catalogue were deposited with the Department of Antiquities in Petra, and the remaining artifacts and smaller architectural fragments were registered and boxed on site and reburied (see Fig. 5).



**Fig. 5** The Great Temple. (a) Before reconstruction; (b) After reconstruction

Now that all the temple columns have been located, their reversible re-erection has been undertaken. Using a tested mortar which in composition is similar to the original Nabataean mortar also has consolidated architectural elements that have been imperiled both from 2000 years of erosion as well as by recent excavations.

The following abbreviated listing includes measures that have been undertaken for preservation, restoration and safety considerations, beginning with the Propylaea Steps in the north<sup>[7]</sup>.

### 2.1 Propylaea steps

The step foundations have been partially consolidated by using mud mortar and small field stones prior to the restoration of the steps using new ashlar blocks.

Vegetation located on the steps (and along the Colonnaded Street) has been removed in order to prevent damage by roots to surrounding structures.

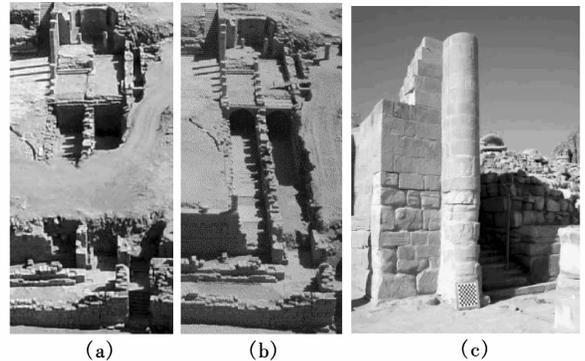
### 2.2 Lower Temenos, West Exedra

Gaps along the eastern portion of the walls have been filled with mud mortar and small stone wedges. The face of the walls has been treated by pointing with mud mortar and stone wedges. Gaps occurring between the column drums have been treated either by removing and re-placing the drums or by injecting mud mortar (grouting) between them. The drainage channel in front of the West Exedra has been covered with sand and has been backfilled. The east wall of the West Exedra has had the blocks removed and replaced, and this wall has been stabilized. The top of the West Exedra wall has been pointed (see Fig. 6).

### 2.3 Western Lateral Stairway between the Lower Temenos and the Temple Forecourt

East and west staircase walls have been treated with pointing and missing ashlar have been replaced with new blocks. The staircase foundation has been treated by the filling of missing sections with mud mortar and small field stones prior to the stair restoration with the original ashlar uncovered in the excavation. New ashlar had also to be quarried and cut to size for the missing treads. A portion of the small hexa-

gonal pavers of the Temple Forecourt at the top of the west staircase was consolidated<sup>[8]</sup>.



**Fig. 6** Lower Temenos. (a) Lower Temenos West Cryptoporticus before excavation and reconstruction; (b) Lower Temenos West Cryptoporticus after excavation and reconstruction; (c) The East Exedra Engaged Column, re-erected

### 2.4 Upper Temenos, Temple Forecourt

Exposed ceramic drainage pipes were covered with sand and backfilled. The damaged hexagonal pavement in the Forecourt has been covered with a thin layer of sand until such time as the pavement can be consolidated and restored. Further excavation is required in order to determine how to proceed with the consolidation of the pavement and its subsurface. (The use of geo-technical cloth to cover this area was precluded by the budget.) The central staircase foundation has been consolidated by using mud mortar and large pebbles. A safety barrier has been erected at the top the staircase. Exposed sections of the canalization system underlying the Forecourt and the extreme eastern side of the Forecourt have undergone consolidation of their crumbling edges by the use of mud and lime mortars. These exposed sections have also required safety barriers<sup>[8]</sup>.

### 2.5 The Great Temple, the Temple Porch

The column drums have been removed and re-erected. No mortar has been placed between the drums. The Great Temple style bate has been protected from further exfoliation and deterioration by having its blocks pointed. The foundations of the style bate have been consolidated by using mud mortar and small field stones. This preceded the restoration of the stairs using existing worked stones. A staircase has been constructed from the Temple Forecourt to the Temple Porch, using ancient ashlar.

### 2.6 Temple Pronaos

Remnants of the fragile plaster stucco decoration on the exterior south-western column have been treated professionally with sealants and interior injection in order to forestall deterioration. Column drums have been removed and subsequently re-erected in their original

positions and mud mortar has been injected between the drums<sup>[9]</sup>.

### 3 Directive Thinking

The dangers that the original inhabitants of Petra faced around the turn of the first millennium are not those that threaten the site today. Although the city was, at one time, essentially lost to all but the local Bedoul tribes, its “rediscovery” in 1812 has drawn increasing waves of tourists. Although the Bedoul peoples used the tombs as dwellings and cowsheds until Petra was declared a World Heritage site in 1985, the real threat to maintaining Petra for future generations has been local and international tourism. By the mid-1990s, the site received four hundred thousand visitors yearly, although that number has recently declined owing to local political tensions.

Tourism at Petra can be a double-edged sword because more visitors make conservation more of a priority. Vandalism, litter, and other problems associated with increased traffic pose new threats to the site. In the last twenty years, many projects have been undertaken by the Jordanian government and outside agencies to preserve the site. Among the more successful conservation efforts is one that has dealt with the infrastructure needed to serve the tourism industry, which generates one billion dollars annually and is essential to the local economy. In 1996, a \$ 27 million plan was set up to create an adequate drainage system and a new road network to replace the one currently clogged with buses and taxis. In addition, the Petra National Trust has commissioned a Swiss company to create a series

of dams on the site in an effort to prevent possibly disastrous flash flooding. Also, pine and olive trees have been replanted and ancient terraces have been restored to better manage torrential rainfalls. Local residences, vendors, and businesses are being encouraged to move further away from the site, creating a buffer between Petra and the local economy.

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## 皮特拉城的探索和保护

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**摘要:**皮特拉是约旦的一座著名古城,它是古代阿拉伯国家间的交通要塞,现今则是世界上最著名的考古遗址之一,1985年被联合国教科文组织公布为世界文化遗产地段.文章简要阐述了皮特拉城的历史和文化价值,着重介绍了对文化遗产的保护,尤其是对皮特拉神庙遗址的加固保护研究,对人们了解不同地域古建筑的保护有着借鉴意义.对皮特拉的探索不仅是一种对遗址保护,当地政府还在努力寻找从物质及经济方面的改善,用规划的手段,使这座古城的城市活力再现.

**关键词:**城市活力再现;保护;保存

**中图分类号:**TU984.11<sup>+</sup>4