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Douglas C. Comer

Tourism and Archaeological Heritage Management at Petra

Driver to Development or Destruction?



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Tourism and Archaeological Heritage Management at Petra

Driver to Development or Destruction?

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This volume is dedicated to the memory of Dr. Fawwaz Al-Khraysheh, Director-General of Antiquities of Jordan from 1999 to 2010, who worked tirelessly for the preservation of the archaeological heritage in Jordan, the region, and internationally.

Series Foreword

When I was elected a member of the Executive Committee in 1981 my candidature, which was strongly backed by the UK National Committee, was based on what I perceived to be the neglect of the archaeological heritage by ICOMOS. This struck a chord within the many archaeologist members, and a vigorous campaign led to the eventual creation of ICAHM at the General Assembly in Washington DC in 1984, though not without opposition on the part of some senior ICOMOS members.

The new Scientific Committee set itself two tasks in the its first three years: the creation of a world database of archaeological heritage protection and management institutions and the drafting of an ICOMOS charter for the protection and management of the archaeological heritage.

ICAHM began seriously promoting its objectives to the wider archaeological community as well as to the ICOMOS National Committees in 1986, when the first President, Margareta Biörnstad, Head of the Swedish National Heritage Board (Riksantikvarieämbetet) gave a paper to the First World Archaeological Conference in Southampton [1]. The first presentation of the ICAHM Charter to a wider specialist audience was at a conference in Stockholm (Lund 1989). The response of the audiences at both events was enthusiastic, and the Charter for the Protection and Management of the Archaeological Heritage was finally approved by the 9th ICOMOS General Assembly in Lausanne in 1990.

The main theme of the Stockholm conference [2] was a very topical one at that time, “Archaeology and Society: Large-scale rescue operations—their possibilities and problems.” The 1994 ICAHM Conference in Canada [3] similarly addressed an issue of global concern for archaeologists and heritage managers, “Archaeological Remains: In situ Preservation). There has been something of a hiatus in ICAHM conference organization and publication since that time, and so the latest initiative of publishing a series of ICAHM Briefs is highly commendable.

Once again, ICAHM has identified a theme that is of intense concern to archaeologists, scientists, historians, architects, and site managers all round the world. The archaeological heritage has in recent decades become a major theme of tourism, and at the same time a source of revenue for both public and private

owners. The impact of rapidly growing tourist numbers on archaeological sites and monuments of all kinds, many of which are fragile and vulnerable, is often shockingly visible. Not only is it physical damage that is inflicted on this heritage: whilst local communities may benefit economically, they are at the same time rendered vulnerable to the many forms of political and economic change that our present societies are increasingly being exposed to.

Over the past half-century I have been fortunate enough to visit archaeological sites and monuments all round the world in several capacities—as student, tour guide, management consultant, and ICOMOS expert evaluator of properties nominated for inscription on the UNESCO World Heritage List. It has been instructive, for example (and not infrequently depressing), to observe how the condition of certain monuments has deteriorated over, and more especially before and after World Heritage Listing. I know two of the four World Heritage monuments selected by ICAHM for this news series in this way.

My first visit to Petra was in 1947 when I went from Gaza, where my regiment was stationed, in a Jeep with a fellow-officer to look at the “rose-red city half as old as time.” When I see David Roberts engravings or paintings from the mid-nineteenth century I am taken back instantly to what I saw then, a romantic scene of ruins and Bedouins that seemed to be existing happily side-by-side without any impact on one another. Nowadays the Bedu have been banished, along with their livestock, and the site is populated only by tourists and tour guides, who are unwittingly causing greater damage to the remains than their predecessors.

It was again thanks to the British army that I paid my first visit to Pompeii. I went with a convoy of trucks down from Venezia Giulia, where my regiment was stationed, to purchase wine, cheese, and other goodies before we left for the rigours of Palestine, and a couple of us took the opportunity to explore Pompeii for an afternoon. It cannot be denied that it was then in a sorry state, and I saw little improvement in the decades that followed. Despite the efforts of Pier Giovanni Guzzo and his colleagues over the past decade or so, the experience is still a depressing one: a combination of ill-managed visits to some “honeypot” features and local corruption siphoning off much of the enormous revenue from entrance fees.

These are high-profile examples of the way in which tourist development is degrading the archaeological heritage. I have witnessed countless other examples on less famous, though equally significant, sites and monuments elsewhere in the world. On my most recent visit to the Acropolis in Athens I was appalled to see the crowds of tourists swarming over the site: at times I was reminded more of football crowds at Stamford Bridge to watch Chelsea take on Manchester United. The atmosphere was oppressive and the impact of so many feet on the steps and terraces was plainly visible. The millions of visitors to the stretch of the Great Wall at Badaling, near Beijing, cause physical damage that requires continuous conservation and reconstruction, a situation that is duplicated in Agra at the Taj Mahal.

The time is overdue for an intensive and objective review of the relationship between the protection and interpretation of the heritage on the one hand and

latter-day exploitation for profit, since the significance and preservation of this heritage are seriously threatened. ICAHM has a vital role to play in this review and in the development of policies and procedures that will benefit both the past and the present.

Henry Cleere
Member of the ICOMOS Executive Committee from 1981 to 1990
First Vice-President of ICAHM
ICOMOS World Heritage Coordinator from 1992 to 2002

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Author Biography Henry Cleere switched his career to archaeology after working in the steel industry for nearly twenty years, eventually obtaining his PhD in 1980 at the Institute of Archaeology of University College London (where he has been Honorary Professor of Archaeological Heritage Management since 1998). He was Director of the Council for British Archaeology from 1974 to 1991, followed by 11 years (1992 to 2002) in Paris as World Heritage Coordinator for the International Council on Monuments and Sites (ICOMOS). Since that time he has been a consultant on the management aspects of World Heritage and other urban and archaeological sites in a number of countries, including Bahrain, China, Ireland, Israel, Japan, Kazakhstan, Kyrgyzstan, Oman, Tunisia, and Ukraine. He has edited two major works on heritage management: *Approaches to the Archaeological Heritage* (Cambridge, 1984) and *Archaeological Heritage Management in the Modern World* (London, 1989). A founder member and first Secretary General of the European Association of Archaeologists (EAA), he was the recipient of its European Heritage Award in 2002. In 2010 he received the annual Conservation and Management Award of the Archaeological Institute of America. He is currently a Senior Advisor to the US-based Global Heritage Fund.

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Part I
Introduction, Tourism and Archaeological
Heritage Management at Petra

Chapter 1

Petra as a Bellwether Archaeological Site on the World Heritage List

Douglas C. Comer

Some of the most historically and scientifically important, aesthetically spectacular, and famous archaeological World Heritage Sites have seen a dramatic increase in numbers of visitors in recent decades. The International Council of Monuments and Sites (ICOMOS) International Scientific Committee on Archaeological Heritage Management (ICAHM) is evaluating how this greatly increased visitation has affected historical and scientific values at four such pre-eminent sites, a study that has led us to examine as well how ever-increasing torrents of visitors have altered social and economic conditions in nearby communities.

This publication will deal with the first of the four sites, Petra (see Figs. 1.1 and 1.2). Subsequent publications will examine these issues at Machu Picchu, Pompeii, and Angkor. Petra, like the other sites, is visually stunning and resonates with romantic, collective memory, increasingly reinforced and reshaped by tourism marketing.

ICAHM is greatly concerned that inadequately regulated and managed tourism threatens the outstanding universal value of some, if not all, of these sites, and that the unbalanced attention paid to the economic benefits of tourism has not advanced the agenda of the World Heritage Convention. We are concerned that the focus on tourism revenues is drawing attention away from the overarching goal of the World Heritage Convention, which is to build capacity to manage the broad spectrum of cultural and natural resources.

At many archaeological World Heritage Sites, global media sources have reported significant deterioration of site fabric or social disruptions that have been linked to over visitation. Further, while much has been made of the economic benefit to countries and communities in which archaeological World Heritage Sites are located, preliminary research by ICAHM has yielded only anecdotal indications of the magnitude of such benefit, and no reliable data regarding the parties to which benefit has accrued. Nonetheless, tourism at premier archaeological sites has been heavily promoted, often through the activities of international assistance organizations, including the US Agency for International Aid (USAID) and the



Fig. 1.1 Location of Petra within Jordan

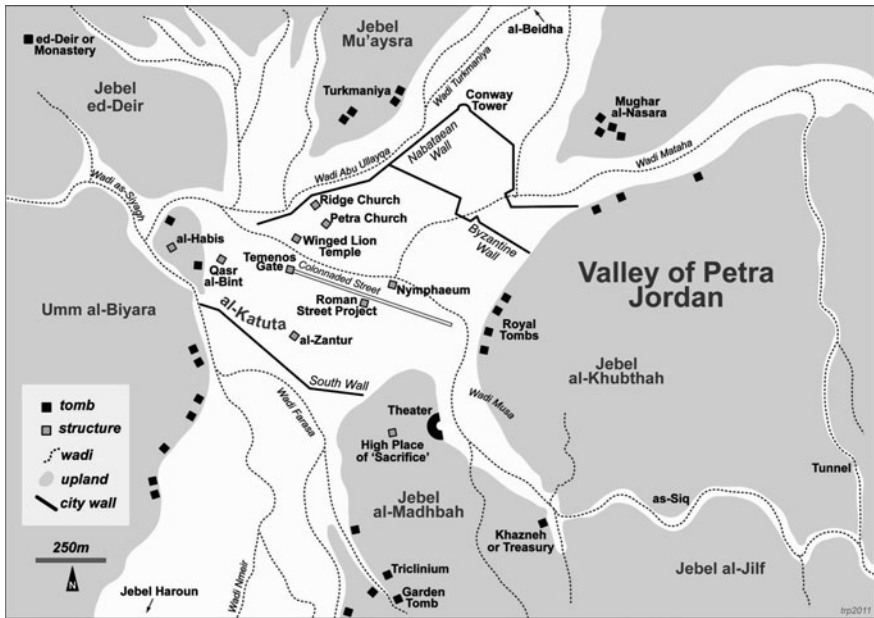


Fig. 1.2 Valley of Petra, Jordan, the “core” area of the ancient city

Japan International Cooperation Agency (JICA). Some host countries have been the recipients of tourism development loans from lending institutions, such as the World Bank and the Inter-American Development Bank.

1.1 Petra

Located in what is today a sparsely populated area of southern Jordan, 250 km south of Amman and 130 km north of the Gulf of Aqaba, Petra was visited only by a few thousand very determined people annually as recently as the 1970s. With inexpensive jet travel, greatly improved roads, and a global advertising campaign, visitation has grown to almost a million people per year (see Fig. 1.3). Petra burst into popular consciousness with the release of the third *Indiana Jones* motion picture, *The Last Crusade*, in 1989. Moviegoers all over the world were introduced to *The Siq*, a winding, narrow chasm with colorful, towering sandstone walls, in which *Al-Khazna*, the exquisitely carved tomb for a Nabataean king, dramatically appears through a narrow cleft as one rounds a corner (Fig. 1.4).

Beyond Al-Khazna, the Siq leads to the core of the two millennia old city, once the capital of the Arab kingdom of Nabataea (Fig. 1.5). For centuries, the Nabataeans controlled the trade in precious commodities across the Arabian Peninsula. They brought spices from Southeast Asia; incense from present-day Yemen and the African continent; silk from the Far East; and gold, ivory, and slaves from Africa across the Empty Quarter and then through Petra to the markets of the West. Around the core of the site are hundreds of tombs carved into the sandstone walls that surround the city, some of these tombs rivaling Al-Khazna in magnificence. Although earthquakes have toppled the standing structures in Petra, excavations have revealed large temples, a *Cardo Maximus* from the Roman era [7], Roman baths, a pleasure garden with complete artificial lake, and churches with beautiful frescos from Byzantine times.

Petra is set in a system of canyons that would probably attract visitors even in the absence of antiquities. They cut through seven different types of sandstone, ranging in color from delicate creams and pinks to deeper reds, which inspired John William Burgon to describe Petra as “the rose-red city, half as old as time.” The canyon system has long constituted an enormous draw to human occupation. Human ancestors, or *hominins*, found their way there to the springs and shelter that the system offered, as evidenced by the Acheulean hand-axes found in Petra, made hundreds of thousands of years ago. On Umm al-Biyara, one of the highest places in Petra, the archaeologists Crystal Bennett excavated Edomite structures from the Iron Age, dating to the sixth and seventh centuries B.C. Had Edomites occupied what we recognize now as the core area of the Nabataean city below Um al-Biyara, evidence of the occupation would now be buried beneath tens of meters of rubble, the remains of Nabataean structures toppled by earthquakes in the first millennium, A.D. This would hold as true for any occupations prior to that of Edomites, of course. In the absence of massive, deep archaeological excavations in the city, or remote sensing technologies capable of imaging what lies deep below ground surface, the early chronology of Petra remains uncertain.

The puzzle presented by the stunning monuments seen by visitors today is that they were built by the Nabataeans. The great wealth that the Nabateans amassed through trade was tied to their nomadic lifestyle, which provided them intimate

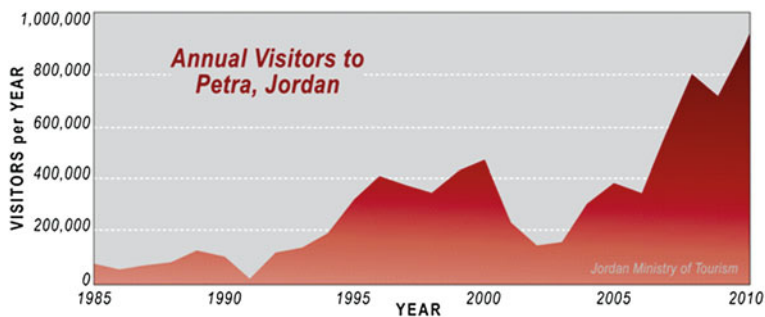


Fig. 1.3 Annual visitors to Petra, Jordan, 1985–2010

familiarity of the vast interior of the Arabian Peninsula. The largest peninsula in the world, it is essentially a desert, with no rivers and with mountains just in the extreme south. Only the Nabataeans had the knowledge and organization to move caravans successfully through a landscape with few landmarks and very little water. When pursued, they could retreat to the desert. In 312, Greeks under Antigonus (Monophthalmus), one of the three generals who vied for Alexander's empire after his death, attacked Petra. They found it deserted and reported seeing no city, or even structures, there. This has been interpreted by most interested scholars as indicating that the Nabataeans were at that time still living in a nomadic way, gathering in the canyons at Petra to organize their activities and also to maintain control of a strategic point on the landscape. Petra offers a place of protection and renewal for caravans going to and from Gaza on the Mediterranean coast; Bosra and Damascus to the north and thence to Anatolia; Aqaba and Leuce Come on the Red Sea; and of course the Empty Quarter and the Persian Gulf. It was also a place where forces could be mobilized to discourage competition from others who might seek to utilize these trade routes.

The wealth realized by the Nabataeans through trade in precious commodities was truly enormous. In *The Periplus of the Red Sea*, written in Greek by an unknown author, probably in the middle of the first century A.D., it is said that a Nabataean agent at Lucee Come during the reign of the Nabataean king Malichus II (40–70 A.D.) collected a 25% tax on imports, and that this rate had been levied for 50 years. Pliny the Elder mentions that fees of various kinds (shipping charges, taxes, tips), could eventually double the price of goods traveling between Arabia Felix and Gaza [9].

This wealth made possible the construction of the great city of Petra, with its nymphaeum, paradisos, temples, baths, and colonnaded street. In 2008, during the preparation of an interpretive plan for Petra, a great effort was made to determine the dates of construction for the best known Nabataean monuments in Petra by consulting with archaeologists, architectural historians, cartographers, stone conservators, geologists, and others who have been conducting research at Petra for decades. In the end, no firm evidence was found for construction of monuments



Fig. 1.4 *The Siq*, a winding, narrow chasm with colorful, towering sandstone walls, leads one to *Al-Khazna*, the exquisitely carved tomb for a Nabataean king, which dramatically appears through a narrow cleft as one rounds a corner. Shown here without the presence of tourists

before 100 B.C., and most seem to date to the first century A.D. or later. Monuments (which as the term is used here excludes roads, steps, water management features, and other infrastructure) at Petra fall almost entirely into two categories. By far the most numerous are the tombs cut into the sandstone walls of the canyon system. Among these are the famous examples of *Al-Khazna*, the tomb of exquisite Hellenistic design which appears as if by magic as one rounds a corner in the *Siq*, and *Ad-Dayr* (Fig. 1.6), fashioned and embellished in a more particularly Nabataean style, located up a long, processional stairway (now almost completely



Fig. 1.5 Beyond Al-Khazna, the Siq leads to the core of the two millennia old city, once the capital of the Arab kingdom of Nabataea



Fig. 1.6 *Ad-Dayr* is thought to have been sculpted late in the Nabataean period, and is more particularly Nabataean in style compared with earlier tombs

destroyed by the feet of donkeys carrying tourists, see Fig. 1.7) to the west of the city center. Standing structures comprise the second category. How many once stood in the core of the city, which occupies about a square kilometer surrounding an east–west colonnaded street, is not known. Many earthquakes have toppled these standing structures over the last two millennia. Two were especially severe. After a catastrophic earthquake in 363 A.D., it appears that much of the city was never rebuilt, although soon after that it became the seat of a Byzantine bishopric. Another earthquake devastated Petra in 551 A.D. Though some people continued



Fig. 1.7 The long, processional stairway that leads to *Ad-Dayr* has been almost completely destroyed by the feet of donkeys carrying tourists

to live there, it no longer played an important role in trade and politics. With the rise of Islam, Petra became inaccessible to the West. For centuries, Europeans were unsure if Petra existed as a real city or only as a place in the imagination. By posing as an Arab, the explorer Johann Ludwig Burckhardt made his way to Petra in 1812, and his description of what he saw there enthralled the West.

1.2 Archaeological Heritage Management: The Paramount Need to Preserve Material Culture

Archaeological sites and landscapes comprise a type of cultural resource that must be managed in special ways in order to preserve their scientific and historical values. In this publication, we will, first of all, present the information relevant to that concern at Petra. Some of this information will be in regard to the nature, condition, and threats to the material at Petra under study by archaeologists today. We will argue, further, that the material culture of Petra will assume even greater significance as archaeological resources around the world are destroyed at an ever-increasing pace because as industrialization and modernization take root around the world. Also to be born in mind is that in the future archaeologists, geomorphologists, geographers, and their compatriots in a wide variety of physical sciences will undoubtedly utilize analytical technologies that we cannot imagine,

much as archaeologists decades ago could not anticipate carbon 14 (^{14}C) dating, the analysis of blood residue, cosmogenic isotope dating, scanning electron microscopy (SEM), and phytolith analysis. Because of this, archaeological resources should be left undisturbed as much as possible at present. We will then explain the reasoning that we have used in developing our conclusions, present those conclusions, and offer recommendations that we think will help to preserve the scientific and historic values associated with Petra. Ultimately, we will espouse the position that capacity for preservation must be developed at archaeological sites before efforts to increase numbers of tourists are initiated.

Archaeological heritage management differs from other realms of heritage concerns in that it must have as its first priority the preservation of material culture, for the simple reason that archaeological analysis depends upon maintaining as nearly as possible both the original condition and context of material of interest. Types of material, the way that material was formed or otherwise altered for cultural purposes, the way it was used, and even the manner in which and the degree to which it has deteriorated can tell us a great deal about the cultures and peoples associated with the material in question. Critically important, too, is the context in which material culture is found. Among the UNESCO documents that make this amply clear are:

- “Recommendation concerning the preservation of cultural property endangered by public or private works” (1968);
- “UNESCO recommendation concerning the safeguarding and contemporary role of historic areas” (1976); and the
- “Xi’An declaration on the conservation of the setting of heritage structures, sites and areas”, adopted in Xi’An, China by the 15th General Assembly of ICOMOS, October 2005.

The World Heritage Convention [11], itself, states that setting is an attribute of authenticity and needs protection through the establishment of buffer zones.

This does not mean that archaeological heritage management is concerned solely with preservation of material—only that it depends upon it. Archaeologists analyze material culture to address a wide variety of questions of pressing concern to history, geography, and anthropology. Material can tell us about the beliefs, values, and practices of peoples in the past. Material culture is both a reflection of human culture and an important agency of cultural change.

Archaeologists and others concerned with the study of material culture use the tangible to understand the intangible. This is possible because the intangible gives form and meaning to the tangible, and so we work backward from material clues. The material is a means to an end. Therefore, our obligation to preserving the tangible does not render us incapable of understanding and endorsing, for example, the ICOMOS Nara Document on Authenticity, which acknowledges that wholesale removal of old material and replacement with new under certain culturally specific situations can produce a wonderful and authentic cultural entity. Our appreciation of temples in Japan and wats in Thailand is enhanced by our understanding of cultural values that impel reconstruction, yet reconstruction is

accompanied by a real loss in the bank of data from which we glean information about the past.

We are concerned as much with the mundane as the spectacular. Archaeological material ranges from soil strata to grand temples and palaces and includes all that they contain. The challenge of understanding and interpreting this material is precisely that which confronts a detective arriving at a crime scene; in fact, the documentation protocols and the logical processes employed, which are alternately deductive and inductive, are quite similar. In both cases, tampering with the evidence, moving something, or introducing new materials that confuse the scene or contaminate samples can greatly hamper or completely undermine our efforts to understand what really happened.

1.3 Tourism

Archaeological sites differ from crime scenes to which they were compared just above in an especially important way: police do not invite thousands of people into the scene that they must analyze, while archaeological site managers do. Over the past several decades, archaeologists and those in related fields, such as art historians, conservators, geographers, geomorphologists, and cartographers, have learned that they must engage the public more directly than can be done by writing technical reports. For this reason, they have embraced public archaeology, which often includes visitation to archaeological sites. They are moved to do so in part as a means of introducing transparency to the field in places where archaeological research has sometimes been seen as intrusive and disrespectful of ancestral groups. Perhaps an even larger factor has been an appreciation of the great public support that archaeology enjoys. Archaeologists and other field researchers know that the public is interested in what they are doing and finding, and they are pleased to share it with them.

The wide acceptance of the desirability of public archaeology has, I would argue, predisposed most archaeologists to view tourism in a favorable light. Why not share the material portal to the immaterial past? Yet there is a difference between visitation and tourism. Apace with the global embrace of capitalism, we are moving uncomfortably into a time when economic valuation of archaeological sites and heritage landscapes has begun. While systematic and reliable economic studies are largely absent, all parties associated with popular archaeological sites sense that, given the public's interest, there is money to be made. Unless artifacts are sold, which, thankfully, has been suggested in only a very few cases, archaeology becomes valuable in an economic sense only when it is a draw to tourism. And it is here, of course, that we find the rub—a friction between the flow of tourists through archaeological sites and the materials that comprise these sites. Tourism at the four sites that ICAHM is evaluating offer numerous examples of such friction, although similar examples could be drawn from many other archaeological sites where large numbers of people are channeled through

restricted, sensitive, or unpatrolled areas. Carvings and monuments have been broken by vehicular activity; ancient steps largely destroyed beneath the hooves of donkeys carrying tourists up and down steep slopes; mason's marks and inscriptions abraded away by the curious; and ancient walls toppled by lounging tourists, who are sometimes invited to special events at places where access to vulnerable resources is unrestricted. Visitor flow, in some cases, has been directed to areas that are not only vulnerable, but also that place visitors in positions of extreme vulnerability. Trails and trail maps not infrequently leave tourists disoriented, lost in conditions of extreme heat or cold, and lured into areas of difficult terrain, where they fall and are injured or killed. The dangers are made worse by the fact that many visitors to archaeological sites are elderly. Inevitably, too, away from the eyes of fellow visitors, some local residents offer to sell illegal antiquities to tourists; among these, often, are coins taken from contexts in which, had the location been carefully documented by archaeologists, they might have provided important dates. Isolated tombs and structures are used as ad hoc restrooms by those who have become lost. This is not only highly unpleasant to subsequent visitors, but also becomes damaging to paintings, frescoes, and the stone from which the tomb was carved. Controlling visitor flow is basic to the management of archaeological sites. It affects the lives of those who reside in communities near heavily visited sites, the lives of visitors, and our hopes for understanding ourselves through the study of the past. The greater the number of tourists, the more carefully appropriate levels of visitor flow must be calculated and directed.

1.4 Building Capacity to Manage Archaeological Heritage Before Developing Tourism

None of what has been said so far is intended to deny that tourism at archaeological sites can be a catalyst for public benefit, if appropriately managed. When the capacity to effectively regulate tourism at archaeological sites has been established and implemented, tourism can provide both economic and social benefit for local populations and opportunities for understanding past and present cultures for visitors. Yet tourism at premier archaeological sites today resembles, in important ways, the days of laissez-faire capitalism. As was the case then, unregulated means by which to generate profit has produced great disparities in wealth, the destruction of resources, and real threats to health and safety.

Further, we express concern that the unbalanced emphasis on the economic benefits of tourism has eclipsed the vision of the World Heritage Convention. The World Heritage Convention was formulated decades ago as a means to enhance international understanding, thus reducing friction among countries, which is often based in misunderstanding and fear. Testimony to the power and appeal of that idea can be seen in the fact that *the Convention concerning the protection of the world cultural and natural heritage* has been ratified by more countries than any

other international treaty in history. Damage to archaeological sites and landscapes is irreversible. To the extent of that damage, vital sources of knowledge about and understanding of the human past are lost. To realize the full promise of the World Heritage Convention, we must build capacity to manage tourism at archaeological sites before enticing large number of tourists to visit them.

1.5 Petra in the Historical Context of the World Heritage Convention

The manner in which *the Convention concerning the protection of the world cultural and natural heritage* came into being, we argue here, has strongly influenced the way that it has been implemented. With all of the benefit that the Convention has brought to the world, we have come to the regretful conclusion that the way that it has been implemented has been to the detriment of archaeological sites that have been inscribed on the World Heritage List.

Richard M. Nixon, President of the United States from 1969 to 1974, was a champion for the World Heritage Convention. By some accounts, his support for this and more generally for environmental legislation such as the National Environmental Policy Act was motivated by his realization that support for the environment was politically popular. Though he questioned the concern that Nixon publically proclaimed about the environment, Lee Talbot, the chief scientist of the Council on Environmental Quality during the Nixon administration, said in a 1998 newspaper interview that, “no president since or before, except maybe Teddy Roosevelt, has been willing to put as much political muscle into environment” [10].

According to James K. Reap, in “the United States and the World Heritage Convention,” Nixon’s Under Secretary of the Interior Russell Train has said that the idea for a “Trust for the World Heritage” had emerged at a White House Conference as early as 1967 [6]. Train recommended to President Nixon that he propose this in his message to Congress in 1971. In that year, President Nixon went on record with this statement:

It would be fitting by 1972 for the nations of the world to agree to the principle that there are certain areas of such unique worldwide value that they should be treated as part of the heritage of all mankind and accorded special recognition as a World Heritage Trust. Such an arrangement would impose no limitations on the sovereignty of those nations which choose to participate, but would extend special international recognition to the areas which qualify and would make available technical and other assistance where appropriate to assist in their protection and management.

A task group from the United States National Park Service was sent to Paris to work with UNESCO in drafting the Convention. Few would contest the fact that the United States National Park Service greatly influenced the form and implementation of the Convention; even today it is the agency within which the Tentative List, the list of sites that might someday be nominated to the World

Heritage List, is kept. As Reap also reports, in 2005, then United States Secretary of the Interior Gale Norton said, in a statement she gave after the election of the United States to a seat on the World Heritage Committee in October, 2005:

U.S. participation in the World Heritage Convention was to help spread the uniquely American idea of the national park around the globe....To strengthen the credibility and currency of World Heritage designation we must ensure that future nominations and designations of new sites be those that have true global significance.

The United States National Park Service, however, was not the only influence on the final form of the Convention. Reap says:

Train put forward the idea at the Stockholm Conference on the Human Environment. 4 why is the number 4 here The Stockholm Conference significantly raised the international profile of environmental concerns and highlighted the inextricable relationship between the environment and economic development. Several international treaties grew out of the deliberations there. The US initiative, embraced in Stockholm, became the World Heritage Convention later that year when adopted by the UNESCO General Convention. Combining both natural and cultural heritage protection, the Convention not only spurred efforts to conserve significant individual resources but also arguably contributed to the evolving concept of sustainable development.

The United States became the first country to ratify the Convention. Like all countries that became signatories thereafter, the United States thereby agreed to work toward accomplishing very ambitious goals.

Article 5 of the Convention, for example, obligates States Parties [11]:

- (a) to adopt a general policy which aims to give the cultural and natural heritage a function in the life of the community and to integrate the protection of that heritage into comprehensive planning programmes;
- (b) to set up within its territories, where such services do not exist, one or more services for the protection, conservation and presentation of the cultural and natural heritage with an appropriate staff and possessing the means to discharge their functions;
- (c) to develop scientific and technical studies and research and to work out such operating methods as will make the State capable of counteracting the dangers that threaten its cultural or natural heritage;
- (d) to take the appropriate legal, scientific, technical, administrative and financial measures necessary for the identification, protection, conservation, presentation and rehabilitation of this heritage; and
- (e) to foster the establishment or development of national or regional centres for training in the protection, conservation and presentation of the cultural and natural heritage and to encourage scientific research in this field.

The World Heritage List, established by Article 11 of the Convention, is almost certainly better known than the World Heritage Convention itself. Article 5 and the other admirable objectives of the Convention have been overshadowed by it. The Convention asks that each State Party keep a list of sites that might ultimately be nominated to the World Heritage List. Nomination dossiers are reviewed by a

variety of people and organizations. Those mentioned in the Convention are the International Centre for the Study of the Preservation and Restoration of Cultural Property (ICROM), the ICOMOS, and the International Union for Conservation of Nature and Natural Resources (IUCN). Dossiers and review comments are provided to the World Heritage Committee, which is composed of representatives from 21 States Parties. The selection of States Parties participating in this way is by rotation. At least every two years, the Committee meets and determines by vote which of the nominated sites will be inscribed on the List and which will not. In some cases, the Committee requests that changes be made to a nomination form or that additional information be supplied in it.

While one could argue if or how much inscription on the World Heritage List attracts additional numbers of tourists, it is clear that the World Heritage List is important to the tourism industry. Organizations concerned with enhancing tourism revenues regard inscription as highly desirable. According to the *Travel and Tourism Competitiveness Report for 2011*, Travel and Tourism comprises 9.2% of global GDP, 4.8% of world exports, and 9.2% of world investments. In that document, a factor in one of the “pillars of competitiveness” is identified as “number of World Heritage cultural sites.”

We argue here that “the List,” because of the way it is promoted in the tourism industry, has drawn attention away from the objectives of the World Heritage Convention. Like the sound bite in the news media, it appeals to a public overwhelmed with information coming from all manner of electronic media, much of it of questionable accuracy and of little importance. Although it now provides a list of destinations to an affluent public often distracted by the banal, the value of World Heritage Sites “brand” could diminish as more sites are inscribed (there are now over 1,000). This will almost surely be the case if more are seen to display questionable outstanding universal value, and as more are “used up” though degradation of resources and over exposure through mass tourism.

1.6 Conservation Versus Preservation

From the beginning of the US National Park System, the National Parks were seen to be “crown jewels” of a country without a monarchy. Instead of scepters and crowns, the National Park Service would identify the places that represented the soul of the young country. These, because the nation was so new, tended to be places of great natural beauty. They could also be showcases for conservation. As we shall see, management appropriate to conservation of natural sites is not the same as management that effectively preserves cultural sites. For example, activities such as minimally supervised hiking, camping, picnicking, rock climbing, and other recreational activities can sometimes be sustainable at the former but very seldom at the latter.

Many have argued that the model for US National Parks was Yosemite. On June 30, 1864, President Abraham Lincoln granted Yosemite Valley and the

Mariposa Grove of Giant Sequoias to the State of California, "... upon the express condition that the premises shall be held for public use, resort, and recreation, and shall be inalienable for all time." In 1872, Yellowstone, which was located in a federally governed territory, became the first true national park. The actual mechanism by which the federal government could legally assume administration of the park was not put into place until October 1, 1890. The legislation that accomplished this passed by a narrow margin, and it is very likely that it would not have passed at all if not for heavy lobbying by not only conservationists, but also by businesses. Among those business especially interested in passage was the Northern Pacific Railroad, which saw a system of National Parks in the United States West as destinations, places to which travelers using the intercontinental rail system that had been built with so much expense and effort would be drawn. In time, the railroad opened hotels and restaurants and offered transportation from rail lines to the parks themselves (see [8, 14]).

The Pulitzer Prize winning author Wallace Stegner famously wrote that the national parks were "America's best idea." And in fact, many nations soon saw merit in the concept, among the first of them Canada and New Zealand, then Sweden, the Congo, and South Africa. The common denominator in all of these cases was that the park systems were largely understood to be places of natural beauty. It would be many years before the numbers of visitors to these places were great enough to affect the basic qualities that made them remarkable; the concern at the time was simply to get people there. Ideas such as ecosystems were embryonic. While a few biologists might discuss range and habitat, these were not in the common lexicon.

There is a basic and profound difference between what are termed natural resources as opposed to archaeological resources. Mountain ranges, waterfalls, broad valleys, and the plants and animals in those places can surely be damaged, and in time irreversibly so, but are to some extent resilient. We can see this in the concept now widely employed of "limits of acceptable change." An example of such a limit of acceptable change might be that a 10% reduction in the number of certain species of plant within a given area might be acceptable, but a loss greater than that might affect the balance of the ecosystem of the region to the extent that the plant species could no longer survive there. That being so, if change can be monitored effectively, it can be arrested before it becomes irreversible. The same concept can be applied to certain kinds of non-tangible cultural resources. If the numbers of musicians, dancers, or craftsmen following traditional forms decreases, this can be detected in time to provide programs and activities that train new practitioners of the forms. This is effective conservation.

Archaeological resources are, in great contrast, absolutely nonrenewable. When material remains are destroyed, damaged, or removed from context, the information that might have been produced through their proper analyses is lost forever. The concept of "limits of acceptable change" is of little value in regard to physical change. Any physical change is unacceptable. Archaeological resources must be preserved.

Even in park systems now well-established, such as the US National Park Service, there is no full appreciation of this difference by all involved parties, but

pressure by archaeologists in and outside the service has sometimes produced safeguards against loss of irreplaceable fabric. Where this has been successful, access to sensitive resources has been the key. The classic example is the road to an archaeological site in the US National Park system, Chaco Canyon. The prehistoric site displays the most sophisticated masonry architecture dating to a prehistoric period in the United States. The road has deliberately been left difficult to negotiate, as rough as a washboard in the best of weather conditions, and almost impassible in rain and snow. Pressure from local business and politicians to improve the road are unrelenting. Over time, however, and after many mistakes, the US National Park Service has determined that it is far easier to limit access and therefore development and the accompanying damage to resources than to repair damage to them, which in the case of archaeological resources is impossible. In this, the United States was in the enviable position to have made mistakes and learned from them before mass transportation systems and mass tourism arrived fully on the scene.

1.7 The US Model Applied to the World Heritage Convention and the World Heritage List

The World Heritage List was to provide examples of premier sites, which were to be exemplars of conservation and preservation. The List was to attract attention to the World Heritage Convention, but has come to dominate it. In no small part, this is because the List provides destinations, those must-see places that busy people with disposable income hear about because they are listed, just as do National Parks in the US.

Important to understanding the serious threats to sites on the World Heritage List is that it is disproportionately composed of cultural sites. In contrast, parks in the United States and other countries were and are largely selected by virtue of natural attractions. Part of the reason for this might be an accident of history. UNESCO headquarters were established in Paris, and Europe was full of cultural sites. And not just any cultural sites, these were the icons of high culture that to any set of educated people from anywhere in the world seemed to constitute “no-brainers.” Without them, how could any list of preeminently important sites claim to be such? The List rapidly began to be filled by such sites. Educated people, of course, realized very quickly that such aesthetic jewels resided outside of Europe, too. Very soon, efforts to include sites of high aesthetic value in other parts of the world began. These also tended to be cultural sites. In developing countries there are areas of astounding natural beauty, but developing countries have often not established management entities for them. In contrast, it is much easier to delineate and identify a cultural site, even if a formal, discreet management system organization is not in place. In fact, for most such places, such a management system did not exist.

1.8 Defining Petra: Tourism Destination or Archaeological Preserve?

At Petra, one can see how the historical context in which the World Heritage Convention was prepared and the World Heritage List was launched has affected the site from the time of its inscription until now. We can also see here the presumption that certain “must see” sites simply belonged on the list. The nomination and evaluation process was clearly regarded as a mere formality by the World Heritage Committee. There is little evidence that the World Heritage Committee gave serious attention to basic concerns such as establishing site boundaries, conducting a reasonably comprehensive inventory and evaluation of resources within the World Heritage Site area, and establishing an effective and realistic management. As far as can be seen in archived documents, and the recommendation of the ICOMOS advisory body that identified the absence of a management plan and even of boundaries for the site as impediments to inscription as a World Heritage Site was ignored. This recommendation was prepared by an ICOMOS expert sent to Petra in May of 1985, and reads as follows [4]:

The phenomenal Nabataean city of Petra which was half built and half carved into the rock interior of a circle of mountains riddled with corridors and gorges is obviously one of the most precious cultural properties man's cultural heritage [sic]. Thus, ICOMOS cannot but enthusiastically welcome the nomination filed by the Hashemite Kingdom of Jordan.

Nevertheless, we cannot give a firm recommendation after our initial highly favorable opinion due to the fact that the hastily prepared file is not sufficiently documented.

As there is no plan for Petra National Park, all efforts to determine the exact limits of Petra would be fruitless. The details which the Division of Cultural Heritage requested the Jordanian government to provide in its letter of March 7, 1985, still have not been received and so we cannot at present propose a positive evaluation.

The entire nomination form of record contains only three pages of text [2]. In these pages, only coordinates for the center of the nominated property are given. Coordinates for boundaries are not given. Under the description of legal status, reference is made to the “National Park of Petra,” which seems not to have existed at this time. At the time of this writing, there is no national park system in Jordan, although a study done by a group that included representatives from the US National Park Service envisioned Petra as possibly being the first national park in Jordan. As described in subsequent sections of this publication, the first reference to a Petra Archeological Park was made in 1993, and Petra Archeological Park seems not have existed as an entity to be managed under a unified management system until 2003, and did not become a governmental entity with access to a budget of its own until 2007. The nomination form does refer to the Antiquities Law of 1935, which gives the government of Jordan sole ownership of immovable antiquities and expressly states that ownership of land does not entitle the owner to ownership of antiquities on the land. The statement is also made that this law protects Petra from damage by farming or building activities. Whether or not this was or is so can be argued, but what is inarguable is that in the absence of a

management structure to enforce such laws, damage to antiquities through farming and building has occurred since inscription. The nomination also includes a well-written outline of many of the prehistoric and historic occupation periods at Petra, but this is only a page in length and is far from exhaustive in listing the sites and types of sites there. Finally, it outlines plans for excavations and restorations at Petra, the majority of which have not been completed. The final statement is as follows:

This is an enormous program which the Department of Antiquities will not be able to achieve without financial support from abroad. But without international efforts to salvage this unique site, Petra will remain unknown to the archaeologist and will soon disintegrate to the shame of our modern techniques and zeale to protect and [sic] international world heritage.

There is no justification for inscription in the 1984 letter [2], nor is there a statement of outstanding universal value, as these were not prepared at that time.

Appended to the original nomination letter and included within the World Heritage Committee Nomination Documentation for Petra [3] is a nomination form, in which the justification for inclusion on the World Heritage List is divided into a) cultural property and b) natural property. This form appears to have been prepared after 1994, as it refers to the “Jordan, Petra National Park Management Plan—Main Report. Coordination Barry Lane and Bernard Bousquet—UNESCO, 1994.” Under a), the following justification is provided:

The site of Petra is considered of a universal cultural value because of the varied architectural monuments from Prehistoric times to the Medieval Period.

The cross relations with Hellenism in the west are crucial for the dedefinition [sic] of art in the Hellenistic periods and the inter-relations between the East and the West.

Under b), this justification is provided: “the Petra Natural and Historical Park offers a variety of cultural and historical monuments—some of them, such as copper mines et Umm al Amad are unique examples of human technical activities, as early as the fourth millennium B.C.”

As mentioned despite the reservations of the ICOMOS advisory body, during the Ninth Ordinary Session of the World Heritage Committee held 2–6 December 1985, the Bureau of the World Heritage Committee recommended inscription for Petra [12].

In the decision document, the following statement is made (page 7) [13]:

The Bureau recommended the property for inscription on condition that the Jordanian government states precisely what its boundaries are.

In October 1985 the Authorities of Jordan sent a map indicating the delineation of the Property proposed for inscription and have stated in writing that they will preserve the authenticity of the site.

In the decision document, the Report of the Reporter, this terse notation is given: “the Committee noted that the boundaries of the site corresponded to those of the Petra National Park.” This is rather confusing, because Petra National Park was not an established entity then, and in fact there is no a Petra National Park

now. The entity established by Jordan to administer Petra in 2003 or 2007, as variously reported, is called Petra Archaeological Park, as there is no national park system in Jordan.

Given this, where is Petra? On a walk down the valley that begins in the town of Wadi Musa, one passes through the Bab-el-Siq, the gateway to the Siq, and even here spectacular rock-cut tombs and monuments are in evidence. One then enters the Siq, that stunning, narrow cleft through a sandstone formation colored many shades of pink and red, rounds a final corner and sees Al-Khazna. Al-Khazna or 'The Treasury' is widely regarded as a wonderful example of Hellenistic architecture, and just the sort of thing that is consistent with many of the magnificent architectural treasures that can be seen in Europe. If this is not enough, one continues past many other rock-cut tombs with interesting architectural details, to the Theatre, another familiar form from the classical world. Then one enters the city proper. A colonnaded road of Roman design is the most evident feature, running between hills on either side, great mounds of rubble from free-standing structures toppled by earthquakes centuries ago. Anastylosis has been done of what is called the Great Temple to the south of the Colonnaded Road, and to the north of the Colonnaded Road are the partially excavated Temple of the Winged Lions, a large Byzantine church, and nearby a smaller one called the Blue Church. At the west end of the Colonnaded Road is the Temenos Gate, and beyond that the only surviving free-standing structure in Petra from Nabataean times, the Qasr Al-Bint.

That is the core area of Petra, but there is more. A steep path leads uphill to the west, where the well-preserved tomb called Ad-Dayr or 'The Monastery' awaits. And all around the central core for many kilometers are hundreds of other tombs, ruins dating to the Edomite period, Crusader castles, Nabataean High Places of Sacrifice, Natufian sites dating from the time of incipient agriculture, Pre-Pottery Neolith A and Pre-Pottery Neolithic B sites that are some of the earliest small village sites in the world, sites for the slightly later Calcolithic time periods, and other Nabataean towns, such as that at Wadi Sabra, complete with its own small theater. The area contains what is surely one of the densest concentrations of important archaeological sites in the world. The valleys and sources of water near the interface of limestone mountains that reach almost 1,700 m in elevation and the massive sandstone formations in which the hundreds of Nabataean tombs are carved, lower at about 1,000 m, offer a diversity of microenvironments that human and hominin populations have found irresistible for hundreds of thousands of years. Testimony to this can be found in the Achulean hand-axes, crafted 250,000 to 500,000 years ago by human ancestors, which have been found at Petra. As did many later hominin and human groups, the makers of these tools probably traveled up and down the Wadi Araba, which is a continuation of the Great Rift in Africa, and through which flows, to the north of Petra, the Jordan River that drains into the Dead Sea.

The tombs with their beautiful and reassuringly familiar Hellenistic form set in a stunning, romantic place surely cried out for inscription on what is regarded as the list of what Nixon envisioned as site of "unique worldwide value." However,

the report of the ICOMOS mission in 1985 clearly recommended that inscription be delayed. The decades since provide evidence that, in fact, it listed before it should have been.

1.9 Too Much, Too Soon

Of the many threats to Petra presented by contemporary human activity and development there, none is more serious than the deterioration of the tombs and façades themselves. One could argue that inscription on the World Heritage List equips a site to better deal with such threats. After all, an archaeological site becomes eligible for financial aid from UNESCO after inscription that could be used to arrest such deterioration. In reality, such financial support from UNESCO has been miniscule in comparison to need. Perhaps even more shockingly, in the absence of a developed conservation program in Jordan and without guidance from UNESCO and ICOMOS, some of the stone conservation organizations that have provided their own funding have used Petra as a laboratory for untested stone preservation treatments as opposed to conducting non-intrusive documentation and research, and none have addressed the systemic, hydrological threat that has accelerated stone deterioration in the ancient core of the city.

In 1987, a decision was made to provide \$50,000 for research into weathering of the stone from which the tombs were carved and which supplied the cut stone used in free-standing structures. Even then, however, the single greatest threat to stone preservation at Petra was known to be flooding (see [Sect. 1.3](#)). As the area upslope from the Petra core, where the largest and most intricately carved tombs are located, has been developed, the ancient Nabataean system of barrage dams and channels that carried rain water away from tombs and structures and channeled it into cisterns and reservoirs has been greatly compromised. In 1987, there were at most a handful of hotels upslope from the *wadi* that passed through the Valley. Today, there are more than a hundred, the attendant impermeable surfaces of not only buildings but also roads and parking lots have greatly exacerbating flash flooding of the area in which most of the tombs and ruins of Petra are located. Inscription on the World Heritage List made Petra a more popular destination, it in doing so hastened development upslope at a scale that could not be remedied by a \$50,000 study carried out in 1987, or the recent provision of \$67,579 for an “Urgent investigation of the Rock Stability in the Siq of Petra.”

As will be described later in this publication, other stone deterioration studies have been conducted with funding from research organizations outside Jordan. Also described will be efforts to build capacity to address stone deterioration at Petra through the establishment of an effective management structure. Such efforts have met with limited success and have been slow. An example is that while the Petra Operating Plan was completed in 2000, Petra Archaeological Park did not emerge as an autonomous legal entity until 2003 or 2007, depending upon the documents examined. As will be dealt with more fully in later chapters, Petra

Archaeological Park today employs only a fraction of the many positions identified as being crucial to the effective management of Petra in the 2000 Petra Operating plan. The pace of development, on the other hand, has been rapid, and much more has been invested in attracting as many tourists as possible to Petra than in protecting it.

Consequently, the material remains at Petra have suffered. Testimony to this is plentiful (see shaded box).

Today, the rock-cut architectural heritage (of Petra), as well as the buildings erected of ashlar masonry, are at risk because of weathering, decay, insufficient care and lack of conservation.

There are three main causes for the weathering and destruction:

- collapse due to static cracks, gaps and crevasses and falling loose fragments,
- erosion caused by uncontrolled rainwater drainage and floods,
- weathering from salt contamination [5].

A précis of a UNESCO reactive monitoring mission in 1994 is as follows:

The Committee was informed of the findings of the UNESCO mission which took place in April 1994, concerning:

- impact of new hotels under construction in the vicinity of the World Heritage site of Petra
- insufficiency or non-existence of sewage disposal facilities,
- uncontrolled development of villages in the vicinity of the site,
- proliferation of shops,
- insufficient conservation of antiquities, and
- other encroachments upon the integrity of the site.

It was informed that the report has already been submitted to the Bureau of the World Heritage Committee during its eighteenth session in July 1994 and that the Bureau had already expressed its serious concern to the Jordanian authorities regarding the preservation of the integrity of the site (transmitted by the World Heritage Centre by letter of 18 July 1994) and had approved a request for the organization on site of a technical meeting associating the national authorities, national and international agencies concerned, and the two UNESCO coordinators for the Management Plan in order to accelerate the effective implementation of the Petra National Management Plan.

The Committee was informed that this technical meeting was held in Petra in October 1994 and that it had not resulted in any concrete decisions ensuring the preservation of the site, although the situation at the site had further deteriorated, notably by beginning to build two new hotels near the entrance of the site and the granting of building permits for several others.

The Committee therefore expressed to the Jordanian authorities its serious concern with regard to the degradation of the site.

It requested them to urgently undertake the following:

- (1) by measure of conservation, the prohibition to build any new hotel in the vicinity of the site;
- (2) the official creation of the Petra National Park and the implementation of the Petra National Park Management Plan established by UNESCO experts upon request from the national authorities of Jordan, which defines a precise perimeter for the Park, and including the creation of eight protected zones, the creation of a buffer zone in order to control the development of building construction, and establishment of a management authority; and
- (3) to address the World Heritage Centre before 1 May 1995 a detailed report on the measures that have been undertaken to be submitted to the nineteenth session on the Bureau of the World Heritage Committee.

The following year, 1995, UNESCO delivered the following decision:

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The Secretariat recalled that during its eighteenth session, the Committee was informed of the different threats (hotel constructions near the site, insufficient waste water evacuation systems, uncontrolled urban development, proliferation of shops) menacing the preservation of the integrity of the site.

It informed the Committee that by letter of 13 March, the Permanent Delegation of Jordan had sent the Centre a proposal for an extension of the site under the name Petra Natural and Archaeological Park, which was subsequently withdrawn pending completion of the proposal. Furthermore, by letter of 18 March, the Minister of Tourism and Antiquities had informed the Centre of a certain number of measures undertaken to improve the protection of the site: limiting the daily intake of visitors and horses, improvement of sanitary arrangements, regrouping of street stalls, recruitment of a refuse team, creation of a centre for stone conservation and a team to study rock erosion, the improvement of some sites through descriptive panels and trails, establishment of a special bureau to follow up these different projects.

On 14 September the Director of the UNESCO Office in Amman was informed by the Ministry of Antiquities and Tourism, that the Jordanian authorities were also fully aware of the problems caused by the construction of new hotels and that the deliverance of building permits had been halted. The Minister had emphasized the importance of establishing zoning regulations and guidelines for constructions at Wadi Musa which would be prepared with assistance from The World Bank.

If several of the short-term recommendations contained in the Management Plan had already been implemented, the long-term recommendations will be the subject of further studies. A Regional Planning Council for the Petra Region was established, chaired by the Minister of Antiquities and Tourism. It is responsible for all action in the region, including that for Petra. A Technical Committee was established to draw up the zoning regulations, as the first step towards the creation of an independent authority for the site.

The Committee thanked the Jordanian authorities and in particular the Minister of Antiquities and Tourism, for all their efforts and the measures undertaken to ensure the long-term preservation of Petra. It gave them its full approval to proceed as quickly as possible with the establishment of zoning regulations and construction guidelines in order to avoid the proliferation of hotels and buildings, as well as the setting up of an independent local protection and management body endowed with the necessary authority. It invited them to continue to devote their efforts towards the active implementation of the Petra Management Plan prepared with the help of UNESCO experts, and to the extension of this World Heritage site, with the necessary means for ensuring its preservation. It invited the national authorities to keep the Committee informed by April next, through its Secretariat, of progress accomplished.

1.10 Monitoring

Monitoring by UNESCO through reactive missions and periodic reporting is intended to alert concerned parties to deterioration of resources with the objective of stopping degradation before it is irreversible. Nonetheless, in 2000, a Periodic Report was prepared and submitted to UNESCO that made no mention of any of the issues raised in 1994 and 1995. In the section in which the original justification for inscription is presented, the justifications provided in the appendix to the 1984 letter nomination, which was evidently prepared after 1994 (see above), and which were provided for an inscription as both a cultural and natural World Heritage Site (although Petra is inscribed only as a cultural site), was repeated. Criteria for inscription were given as (1), (3) and (4). In answer to the question: "In the view of the State Party, does the statement of significance adequately reflect the World Heritage values of the property?" the answer is "no." In answer to the question, "does the delimitation of the World Heritage property seem adequate," the answer is "yes." In answer to the question, "Does the delimitation of the buffer zone seem adequate," the answer given is "yes." In answer to the question, "Have there been changes in the authenticity/integrity since inscription, the answer given is 'no'."

In answer to a request for a description of, "actions that are foreseen in the future, to preserve the values described in the statement of significance under item II.2," the following information is provided:

A program is currently being embarked upon, as part of the 2cd tourism development project, funded through a loan from the World Bank for Sustainable Site Development of the Petra Archaeological Park, and Petra region, to protect the Site from adverse impact, resulting from high visitation levels and urban growth. The 2cd Tourism Development Project concentrates on five areas:

1. Rapad [sic] rehabilitation and improvement in Urban areas Surrounding the site.
2. Urban Infrastructure Development to improve the Urban image of towns adjoining the Site.
3. Visitor facilities and Management inside the site. A program is being implemented in cooperation with the USA National Park Service to manage Cultural resources and visions.
4. Environment Management to protect the nature and control floods.
5. Developing Capacity for the PRPC to preserve the setting of Petra by establishing controls on urban growth and its direction away from the sensitive areas adjoining the site.

The following “changes in ownership, legal status, and/or contractual or traditional protective measures, management arrangements and management plans as compared to the situation at the time of inscription or the previous periodic report” are given as:

1. Declaration of the protected Archaeological of Petra Archaeological Park in 1993 [sic].

Boundaries

1. In 1993 a law passed declaring and the Petra Archaeological Park [sic] with an area of 264 sq km.
2. In 1995, by Ministerial Order, the Petra Regional Council was declared to cover an area of 900 sq km, inclusive the protected area.

Available resources

In addition to budget allocation in DOA, 25% revenue from visitation fee is allocated to PRPC to fund the operation and maintenance cost of the region.

In answer to the request to comment on the degree to which the property is threatened by particular problems and risks, no threats to visual integrity are noted from the possible sources listed in the questionnaire, which include sites, waste and refuse, constructions, buildings, or badly integrated infrastructures. It should be noted here that most concerned parties would have disagreed with that assessment in 2000. There is mention of the deterioration of the rock facades through wind and rain erosion as well as by salts absorbed by them, but the degree of threat is not suggested.

1.11 Catching Up

There is widespread understanding at both UNESCO and ICOMOS that World Heritage Sites inscribed in years soon after the implementation of the World Heritage Convention were not asked to provide sufficient information or to establish the capacity for effective management. Petra is a case in point. Therefore, “Retrospective Inventories” are now being prepared for such sites.

Retrospective Inventory for Petra ([1], but cites information collected as late as 2006) contains the following statement:

The Petra National Park apparently did not have a formal existence or boundaries at the time of inscription. The only certified map from this era may be item #20. The first official boundaries appear to be that shown in fig. II-1 of the 1994 Management Plan (item #32a). This Park boundary corresponds to item #76, and reappears on #17, which may have been a planning draft for the expanded park that appears in the 1994 Management Plan #35). (Note that a marked-up version of #35 (#35a) includes a penciled version of the old PNP boundary but shifted about 4,000 m northward from the location shown on #17). As an official revision to the Park boundaries in 1995, #35 was withdrawn by the State Party after adverse ICOMOS comments.

Thus it *appears* that #76 is the best representation of the core zone, although #32a shows a buffer zone as well.

Material to be Requested from State Party

Please submit the largest scale topographic or cadastral map available which clearly shows the boundary of the inscribed property and its buffer zone (if any). Please be sure that the maps show both a bar scale and clearly labeled coordinate grid.

Please indicate the size in hectares of the property and its buffer zone.

The Retrospective Inventory also contains a list of 79 documents pertinent to the World Heritage status of Petra. One or another of the contributors to this volume are familiar with almost all of them, or where the documents have not been obtained, the authors know something of what they do contain. What follows, then, is based upon a familiarity with Petra that has been gained over many decades of experience with the site and the management, social values, and preservation issues at Petra. We have witnessed a meteoric rise in numbers of tourists. We have also watched as numbers of tourists plummet when political events in the region dominate the global news media. This unpredictable fluctuation in the numbers of tourists results in extreme hardship for those who depend upon tourism when income decreases result, and raises questions about how well a tourism economy provides a basis for a stable society. The contributors to this publication are not aware of any study on how cycles of poverty affect archaeological resources. Anecdotally, however, it seems that people who become desperate for income might resort to looting during economically depressed times.

1.12 The Organization of this Book

The contributors to this book recognize that implementation of the World Heritage Convention is a work in progress. We encourage the World Heritage Committee to accept this position as well, and to work to establish exemplary management of archaeological World Heritage Sites. Our main intent with this and the three subsequent publications that will evaluate archaeological heritage management at sites which attract large numbers of tourists is to make the point that archaeological sites must be managed in ways that respect and preserve the historic and scientific values that are embedded in the material that makes up those sites. At Petra, it is undeniable that archaeological material has been lost through looting and damage and destruction of tombs and standing structures. This is attributable both through the unmanaged activities of tourists, and unplanned and ill-regulated development that has altered the hydrology of Petra, which has exacerbated destructive flooding. Our fear is that without immediate acknowledgment of the need to manage archeological sites in special ways, we will loose much more of the irreplaceable archaeological heritage. For example, great tides of tourists exploring the backcountry of Petra in search of adventure and treasure might very well result in the loss of archaeological resources before archaeologists have the opportunity to study or even become aware of them.

In [Sect. 1.2](#), Aysar Akrawi, Executive Director of the Petra National Trust, the NGO formed in Jordan to assist Petra, will review the history of site management planning and the organizations that have been established to manage Petra. As we shall see, organization has not always followed plan, and in many cases plans appear not to have been widely disseminated or used. In [Sect. 1.3](#), Talal Akasheh, Douglas Comer, Suleiman Farajat, Thomas Paradise, and Christopher Young describe the effects of tourism at Petra on the archaeological resources there, and to the extant that changes in the social organization of nearby communities has affected archaeological resources in Petra, and the influence of tourism on local communities. Finally, in [Sect. 1.4](#), we will evaluate what we have learned in the preceding sections, noting that international tourism has grown so large so quickly that regulation has not been established or implemented in many places sufficient to protect tourism destinations from damage to cultural and natural resources. We will also review such damage done at Petra, and make recommendations that center on the need to reform the World Heritage Committee.

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Douglas C. Comer is Co-President of the ICOMOS International Scientific Committee on Archaeological Heritage Management (ICAHM) with Prof. dr. Willem J.H. Willems, Leiden University, the Netherlands. Dr. Comer specializes in planning for the management and interpretation of archaeological sites and landscapes as well as in the use of aerial and satellite technologies for archaeological research and management of archaeological resources, and has published extensively on these subjects. He was project director and principal author for the United States National Park Service of the Petra Operating Plan, and, under assignment by US/ICOMOS, was principal author for the Petra Carrying Capacity Analysis and the Petra Management Analysis. His company, Cultural Site Research and Management, Inc. (CSRMI), produced the Petra Interpretive Plan and the Petra Visitor Services Plan. Dr. Comer has served as Chief of the United States National Park Service Applied Archaeology Center, a Fulbright Scholar in Cultural Resource Management, Chair of the Maryland Governors Advisory Committee on Archaeology, a Research Fellow at the Southeast Asian Center for Archaeology and the Fine Arts (SPAFA) in Bangkok and the American Center for Oriental Research (ACOR) in Amman, Chair of the Nominating Committee for the Register of Professional Archaeologists (RPA), and a Trustee for the United States Committee for the International Council of Monuments and Sites (US/ICOMOS). He is Conservation and Preservation section editor for the *Encyclopedia of Global Archaeology*, and ex-officio member of the US/ICOMOS Board of Trustees representing the Society for American Archaeology (SAA). His company, Cultural Site Research and Management, Inc. (CSRMI) (www.culturalsite.com) operates in the United States, Europe, the Middle East, Southeast Asia, Africa, South America, and Central America.

Part II
Site Management, History and Status

Chapter 2

Forty-Four Years of Management Plans in Petra

Aysar Akrawi

As early as 1968 the US National Park Service in its master plan for the protection and use of the Petra National Park described that management structure of sites such as Petra need to grow from and strengthen the qualities that make a cultural site valuable and significant, and in the case of Petra, unique. In response to the impact of growth in tourism to Petra over the past 40 years, the Government of Jordan invited international institutions to prepare management plans for Petra on five occasions. Each of the first four management plans has addressed the values and significance of Petra. The plans are as follows:

- **First Plan:** The United States National Park Service (US/NPS) “Master Plan for the Protection and Use of the Petra National Park” (1968);
- **Second Plan:** UNESCO “Petra National Park Management Plan” (1994);
- **Third Plan:** The United States International Council on Monument and Sites (US/ICOMOS) “Management Analysis and Recommendations for the Petra World Heritage Site” (1996);
- **Fourth Plan:** US/NPS “Petra Archaeological Park Operating Plan”;
- **Fifth Plan:** ATC Consultants GmbH “A Strategic Master Plan for Petra Region” 2010.

There is no institutional memory of the procedure that was followed, especially in the first study. In 1968, however, no stakeholder was asked about site significance or about what his or her values were. Although the other plans included some participation of Jordanian counterparts, there was no systematic participation of the stakeholders in the identification of the values, the major issues, and, thereafter, in the formulation or follow-up of the recommendations they presented.

These plans have served as guiding documents, to a limited extent, for decision makers in the planning and implementation process. (It is not possible to describe the fifth plan, as it has not yet been made public.)

2.1 First Plan: “Master Plan for the Protection and Use of the Petra National Park,” U.S. National Park Service

The US/NPS Plan maintains that Petra’s historical scene is the site’s primary resource and that the sustenance of natural resources is vital in protecting it. As such, and in recognition of the significance of the site and its environs, the US/NPS team took the lead in recommending the establishment of a National Park (later called the Petra Archaeological Park, or PAP) as an independent Park division, with further zoning required. After 25 years, the Council of Ministers issued a Decree establishing the Park as an archaeological and natural protected area in 1993. The Decree went beyond the plan’s recommendation to protect the biodiversity of the Park. However, although such an action was recommended by the plan, the Park’s management did not become independent at the time, but remained a subordinate of the Ministry of Tourism and Antiquities (MoTA).

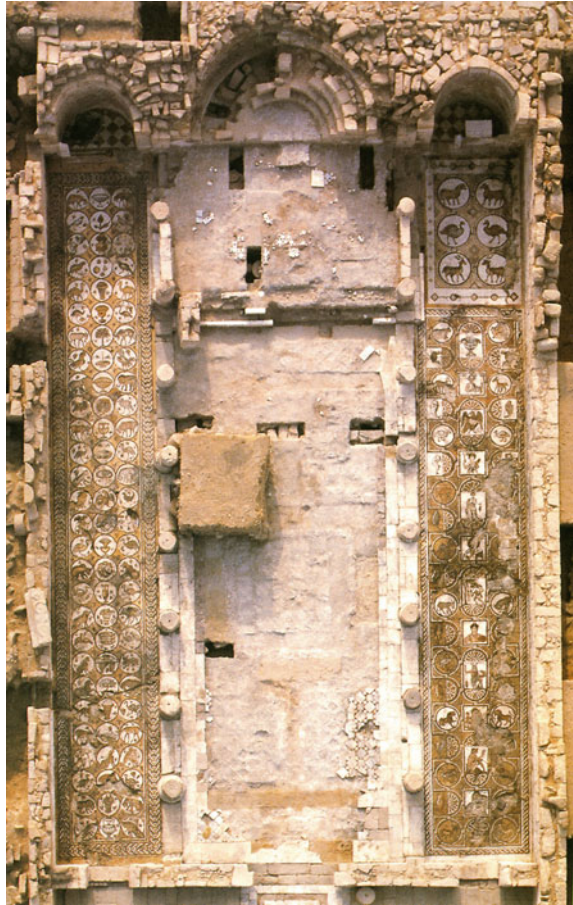
In the field of conservation and preservation, the US/NPS Plan recommended the restriction of excavations until such time as exposed ruins were consolidated, an inventory of historic structures was established, and a historic base map was developed. Although excavations were never stopped, restoration, consolidation, and protective measures have been implemented. Some examples of excavation and restoration projects are the Petra Church (Fig. 2.1), located in central Petra, north of the colonnaded street, which was excavated by the American Center for Oriental Research (ACOR); the Great Temple (Fig. 2.2), located south of the colonnaded street, excavated by the Brown University team; the Zantur (Figs. 2.3 and 2.4) in Nabataean dwellings, located on a hilltop south of the colonnaded street, excavated by the Basel University team; and, more recently, the cleaning and consolidation of the wall painting (Fig. 2.5) in Biclinium 849 by the Petra National Trust (PNT).

The inventory was established through the Jordanian Antiquities Database and Information System project between 1989 and 1995, and it was recently updated and relaunched in 2011 under the name of MEGA-Jordan—the National Heritage Documentation and Management system. It was developed by the Getty Conservation Institute with the cooperation of the Department of Antiquities (DoA) of Jordan. The program is a purpose-built geographic information system that is designed to help inventory and manage archaeology sites at a national level. The system, which operates in both Arabic and English, is web-based, and will standardize and centralize data throughout Jordan.

Regarding the development of a base map of the Petra area, a base map of the city center was produced by ACOR only in 1999. A map zoning the lands of Wadi Musa, Um Seyhun, and Taybeh was produced in 1995–1996 by a local Jordanian engineering firm, Dar al-Handassah, under contract with the World Bank.

The US/NPS Plan addresses the issue of watershed management and recommends the rehabilitation of the Nabataean hydraulic network, in order to protect the antiquities, to guard against flash floods, and to conserve water that is vital to the maintenance of biodiversity. To this end, in the 1970s, DoA placed gabions

Fig. 2.1 Overview of Petra Church, located in central Petra, 1993 (Courtesy J. Myers and E. Myers)



at the mouths of the major water inlets in the Siq. These gabions served their purpose at the time, but proved insufficient over time in sustaining this intended end. In the period between 1996 and 2002, PNT undertook a large-scale rehabilitation of the network. After conducting an in-depth study, PNT implemented a number of projects, starting with the Siq (Fig. 2.6). This was followed by the area covering the Main Wadi Musa route in the Park, starting at the box culvert opposite the visitor's center, followed by the entrance to Bab al-Siq turning right into Siq al Mudhlim (Figs. 2.7 and 2.8) and around the Mataha to the Nymphaeum, where it rejoins the Main Wadi Musa before it pours into Wadi Araba in the North. PNT also studied the area of the Khazne, also known as The Treasury (Fig. 2.9), and will rehabilitate two of the Nabataean dams in the area in 2011/2012.

The social dimension, concerning the peoples inhabiting the region, is addressed by the NPS Plan, inasmuch as the issue affects the antiquities. The plan



Fig. 2.2 Great Temple, located south of the colonnaded street, 2005 (Courtesy M. Joukowski)

recommends the relocation of the Bdul tribe, mentioned earlier in this publication, to a location outside the archaeological site. The reason given was the need for “preservation of the resources of Petra from the destructive effects of human habitation [6]”. Both this plan and a later study of 1978, conducted by UNESCO consultant Sherif al-Hakim, stress the necessity of preceding any relocation with a study of the socio-economic dimension and providing the community with agricultural lands, in order that they may maintain their livelihood. In his recommendations, Hakim emphasized that the design of new housing must be compatible with the lifestyles of the inhabitants, and that the architecture be in harmony with the archaeological park, in view of its proximity to it. Neither of these recommendations was implemented and their neglect has had a negative effect on social, economic, and visual parameters.

The plan addressed other issues through specific project proposals in the fields of tourism development, archaeological protection and preservation, and social and administrative issues. In the 1960s, the intention was to prepare the site for visitors. Towards that end, the plan’s proposed projects involved everything, from roads, electricity, water, hotels, visitor centers, parking lots, and vendor activities, to special uses. The majority of these projects were realized, and those that were not continue to pose nagging problems, as in the case of vendor activities and special park uses, etc. Some of the building developments proposed at the Park’s entrance have resulted in congestion of that area and triggered the construction of large hotels and government buildings in sensitive areas, which affects the natural landscape and scenic views.

Fig. 2.3 Interior of al-Zantur domestic complex, 2007
(Courtesy B. Kolb)



Regarding the zoning of the area, no action was taken until the issue was reintroduced 27 years later in the UNESCO Management Plan of 1994.

2.2 Second Plan: “Petra National Park Management Plan,” UNESCO

The second management plan was created by UNESCO and was assisted by and presented in coordination with the PNT in 1994 [3]. This plan, devised some 26 years after the US/NPS Master Plan, addresses many of the same issues. The values of the site are clearly laid out and expanded. The UNESCO Plan bases its recommendations and proposals on the impact of the level of management at the time on these values. The plan identifies the major issues threatening the integrity of the Park through a combination of cultural, socio-economic, and environmental



Fig. 2.4 al-Zantur domestic complex, 2007 (Courtesy B. Kolb)

Fig. 2.5 Wall Painting in
Biclinium 849, 2008
(Courtesy PNT and
Courtauld)



factors, and it presents recommendations and proposals to remedy these threats. The proposals are comprehensive and cover zoning, conservation of archaeological and natural heritage, Park infrastructure and personnel, tourism, physical planning, sustainable rural development, mitigation measures, training and communication, research and monitoring, and, finally, the implementation of the management plan. On its opening page, the plan states that, prior to its implementation, governmental approval is required of the plan in its entirety, since it involves policy decisions. Although official governmental approval was not

Fig. 2.6 View of the Siq, showing original Nabataean pavement slabs, 2004 (Courtesy G. Palumbo)

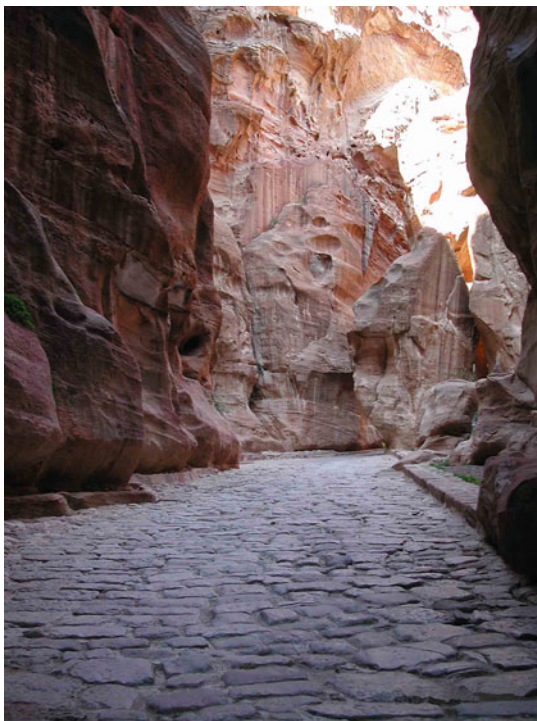


Fig. 2.7 Siq al-Mudhlim before clearance of collapse, 2000 (Courtesy PNT)

Fig. 2.8 Siq al-Mudhlim after clearance of collapse, 2003 (Courtesy U. Bellwald)



granted, the plan has and continues to serve as a guiding document for all projects and activities since then, and a large number of the project proposals have been executed.

Taking its lead from the first plan, the second plan reaffirms the necessity of an independent governing body, although it suggests that this report to the Royal Court or, alternatively, to the Prime Minister's Office. The outcome was the Petra Regional Council (PRC, later renamed the PRPC), which was established in 1995, by the decision of the Council of Ministers. The resulting developments are further discussed below.

The plan attempts to present criteria for the choice of project sites and some of the conservation works being undertaken. It should be noted, however, that there is no formal conservation strategy, to date, set by the DoA for excavation, restoration, consolidation, or monitoring. The criteria for selection, which are generally determined by the applicant and his or her field of interest, range from research interests to providing baseline data, and from the enhancement of sites for tourist

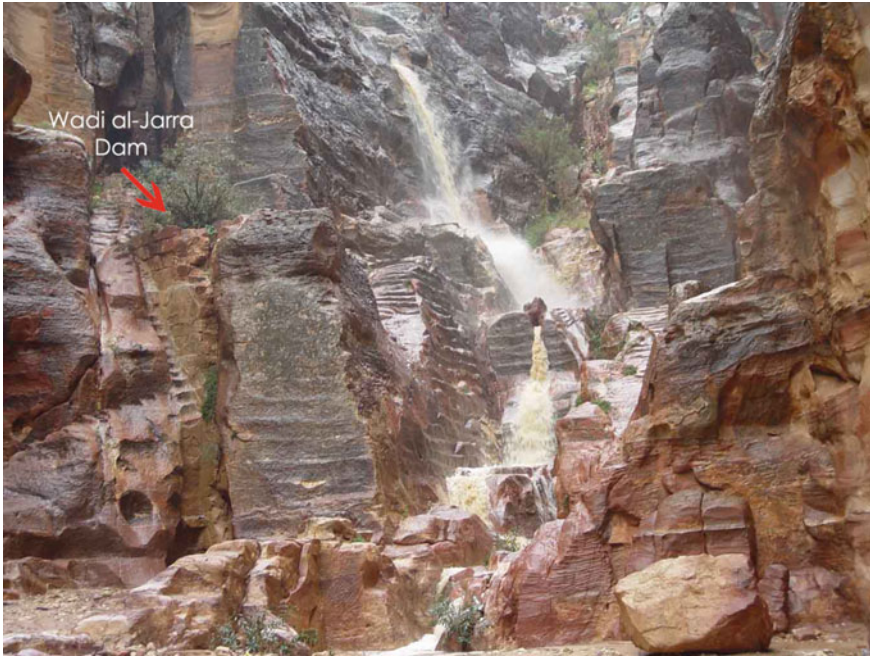


Fig. 2.9 Flash flood, south side of Khazne courtyard, 2004 (Courtesy S. Farajat)

presentation to the protection and preservation of monuments. The numerous aspects of this subject have been addressed in all the management plans, and they await implementation and integration into the site management and monitoring procedures.

A project covering zoning and land use regulation in a limited area outside the Park boundaries, although lacking building regulations, was implemented in 1995–1996. The World Bank contracted a local engineering firm, Dar al-Handassah, to zone and regulate the area between the Taybeh scenic road to, but not including, Um Seyhun, which left a number of sensitive areas not zoned (most notably the area between Um Seyhun, Beidha, and beyond). In addition, the study left the Park un-zoned. Although recommendations of this plan serve to control construction development in the areas with immediate impact on the site, these conflict with the interests of owners in several sensitive locations. Some of these lands are privately owned, while others are Miri lands that fall under tribal or customary law. The restriction of development by traditional owners is not an easy regulation to impose in a tribal society, and doing so continues to present a challenge.

Recommendations to retain the traditional Arab stone-built houses have fallen on deaf ears (Figs. 2.10, 2.11, and 2.12); as a result, these traditional dwellings are almost totally lost to various types of pink-coloured concrete structures. In



Fig. 2.10 Reuse of tomb cover from the Mamluk period, fourteenth to fifteenth centuries A.D. 2004 (Courtesy PNT)

Fig. 2.11 Interior of traditional Bani Atta housing, Wadi Musa, 2004 (Courtesy S. Farajat)



addition to the desire for modernity, it is assumed that the demolition is due, to a great extent, to the increasing value of land, especially after the signing of the peace agreement with Israel in 1994. There are a few exceptions, where villages dating to the Ottoman period have been restored and adapted for use as hotels or shopping areas (Fig. 2.13). Recommendations for infrastructure projects such as roads, water supply and treatment, and electricity have been underway for some time now, as are tourism-related projects.



Fig. 2.12 Traditional architecture in Khirbet Bani Atta before demolition, 2004 (Courtesy S. Farajat)



Fig. 2.13 Traditional architecture in Khirbet Bani Atta after demolition, 2011 (Courtesy PNT)

Under the heading of the conservation of biodiversity, a survey of the flora and fauna of Petra was conducted by PNT and some reforestation undertaken. This now urgently needs to be followed by a study of the integration of nature conservation and nature-based tourism into the overall management of Petra. Despite the recommendation to demarcate areas for grazing and cropping within the Park, so as to reduce their continued effect on the vegetation cover, these activities continue to take place unregulated. Other recommended projects include flood control measures and stone preservation.

Left untouched, to a great extent, is the social dimension, despite cautionary signals among the host communities. At the time of the establishment of the Petra Regional Planning Council (PRPC), it was felt that board membership of two mayors of the six main villages surrounding Petra was sufficient. It soon became increasingly evident that it is necessary to have representation from all six villages to ensure a better understanding of the objectives of the Council and their cooperation as stakeholders. To this date, equitable distribution of representation amongst the six villages surrounding the Park has not been introduced. For the main part, representation on such bodies is given to Wadi Musa residents, and that in and of itself generates discontent.

2.3 Third Plan: “Management Analysis and Recommendations for the Petra World Heritage Site,” US/ICOMOS

The third set of plans, entitled “Management Analysis and Recommendations for the Petra World Heritage Site,” was prepared by a site management team from US/ICOMOS. It was a direct output of a USAID-funded project, the Jordan Sustainable Tourism Development Project (USAID/JSTD/SITES), originally named Cultural and Environmental Resources Management, and it came into effect in 1996. It once again focuses on site management issues, most identified in its predecessor plans of 1968 and 1994. It, too, stresses the need to develop a sustainable tourism industry that does not increase pressure on the site, and it makes recommendations thereof. It addresses the issue of the ineffective management structure of the Park, the need for a comprehensively organized Petra site operation, and the need for cultural resource management to include acquiring and making accessible baseline data, research priorities and procedures, monitoring, treatments for preservation, interpretation and tourism strategy, and public involvement and support.

This plan examined these issues and evaluated the functioning of the PRPC. It reported that the establishment of the council was a good first step toward decentralizing the management of Petra away from Amman. It reviewed the major responsibilities of the council in regard to zoning, land use regulations, licensing of construction, development of infrastructure, and community issues, in addition to those it may have for the site of Petra itself. The plan concluded that, although

related to the protection and management of Petra, the PRPC would spend much of its time in the immediate future dealing with the pressures of Wadi Musa and other villages and communities. In addition to the PRPC, therefore, it recommended the introduction of a separate authority—that of the Petra National Park Agency (PNPA, now being referred to as PAP), which would be solely dedicated to the management of all the functions related to archaeological resources preservation, including physical conservation and development; visitor information and education; and visitor services and safety, all within the protected area only. Nevertheless, this new body would coordinate very closely with the PRPC in view of the common issues that they share. Regarding its location within the government structure, the plan recognizes that the “DoA does not have the full range of legal authority needed to comprehensively manage all functions of Petra. Yet there is a concern that DoA retains a too-strong voice in the protection of archaeological resources there [5].” Although this was not a direct outcome of the recommendation of this plan, in 2007, a separate by-law (No. 78) for PAP was issued. A council overseeing the management of PAP, formed of the key governmental stakeholders and the NGO PNT, was established and began to report directly to MoTA.

The Management Analysis focuses on the socio-economic perspective to a greater extent than its predecessor plans and emphasizes that, whereas “tourism can provide significant sources of revenue, at the same it represents a force potentially destructive of both resources and local communities [5].” It further adds that site viability “depends on the degree to which the site operation can be made complementary to contemporary socio-economic conditions [5].” This is still a timely issue; more than ever before, the local communities have recently vociferously expressed their discontent with the way Petra is managed and their marginalization in decision making.

The carrying capacity study conducted by the same project maintains that after a complete management infrastructure has been put into place and perfected over a number of years, as many as 750,000/year might be accommodated, which goes beyond the figure of 1,500 set in the UNESCO Management Plan. Current statistics show figures going well beyond either capacity study. The Management Analysis takes into consideration the present and foreseeable management system under current site resources conditions and proposes two models using two entry and exit points (the Siq and the Turkomania exit road), and further recommends the development of a trail system for the distribution of visitors. This model would increase the number of visitors from the 1,500 figure set by UNESCO to between 2,900 and 4,300. The Management Assessment stresses, however, that the second entrance should not be opened until more data are available, Petra has an organization in place to manage the large numbers of people, and, very importantly, Petra has a monitoring program started. Now, 15 years later, the Petra Development Tourism Regional Authority (PDTRA) is developing the Turkomania exit for this purpose. The extent of their adherence to the recommendations made in this 1996 plan is contentious and will be addressed under a separate chapter.

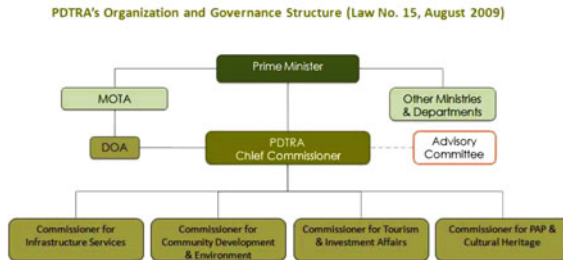
2.4 Fourth Plan: “Operating Plan,” US/NPS (2000)

The Operating Plan differs from its predecessors in that it constitutes a major step towards the establishment of comprehensive planning and management policies, an organization plan, detailed staffing policy, equipment and facilities requirements, operating procedures and standards, a training plan, and the recommended position of the PAP within the organization of the MoTA.

The Plan saw the affiliation of PAP with DoA to be the most logical, since the mission of the DoA is the protection of the archaeological resources within Jordan, and it thus has the legislation to perform this function. The final location of this new structure was discussed at a workshop organized by MoTA, in collaboration with US/NPS: the unanimous recommendation was that PAP report directly to DoA, as opposed to the Petra Regional Authority (PRA).

At the time of the development of this plan, very important prerequisites, such as the financial and human resources essential to making the Plan feasible, were missing, and it is clear that the practicability of the plan depends on the government’s commitment to providing the necessary resources. Furthermore, the by-laws governing the Park were not endorsed. The direct effect of this delay was that the Park Director was not empowered to take decisions and remained in the position of receiving instructions from several government departments, whose interests often conflict with each other and with those of the Park.

More recently, with the establishment of the PDTRA in 2009 (see organization chart below), the realization of the prerequisites as described in the USNPS Operating Plan was made possible, but this at the same time took away the independent status of the Park that had been established with by-law No. 78 of 2007 (explained further below).



2.5 Fifth Plan: “A Strategic Master Plan for the Petra Region,” ATC Consultants GmbH (2010)

In April 2010, the PDTRA issued an international request for a proposal, the key objective being “to seek a qualified company to provide a 20-year master plan for developing the Petra Region in an efficient, balanced and sustainable manner for the benefit of Jordanians. It is expected that the Master Plan is presented in three phases: 3 years as short term, 3–7 years as medium term and 7–20 years as long term [1].”

The plan, it stated, should be based on a “study that covers the entire Petra Region, focusing on the main urban areas, and the key natural landscape and environmental areas associated with the UNESCO World Heritage Site and archaeological park. The PAP must be looked at from a strategic point of view, as Park Management Plans have already been developed. The Strategic Master Plan should also address urban efficiency, economic and social development including all six local communities, mobilization of private sector investment and participation, balanced with the protection of the archaeological park itself” [1].

The Draft Plan was presented by the PDTRA to the local community of Petra. Stakeholders like NGOs, international, and other related organizations, as the UNESCO Jordan Office, were not invited. They only received a copy of the draft as late as October 2011 and have not released official comments on the Plan to-date. Allegedly, the local community had a number of reservations concerning land use in the buffer areas and other issues that relate directly to their interests. The subject of the carrying capacity of the Park was also addressed in the Master Plan. The plan purportedly proposes a considerable increase of visitors per year, to 1,500,000 visitors. This increase represents an increase of 54% over the figure presented in the UNESCO Management Plan. It is assumed that the increase in visitation numbers is based on the PDTRA project to transport visitors out of the site through the Turkomania service road, using buses. (The impact of this project on site significance, values, and integrity will be broached in further detail in the section on management issues.)

There is a discrepancy among the first four plans on the type of management structures and interventions needed for Petra. Four models for the management of Petra have been adopted, with the latest being the PDTRA. This is currently also under review. The approach toward the implementation of the recommendations proposed, however, has been fragmented over the years.

Instead of adopting a holistic approach to the plans in their entirety, sub-projects were selected for implementation, leading to the imbalanced approach we have and continue to witness over the years. This could be due to a number of reasons, including inadequate participation by related organizations and stakeholders in the planning process, resulting in a lack of commitment and follow-up; an insufficient understanding and appreciation of the site values and their potential, which leads to an unbalanced approach to development; inexperience in the

management of cultural heritage sites; and frequent changes in government management.

For Petra to be preserved, it must be understood in its totality. A clear-cut strategy for the conservation and management of the site must be developed. The impacts of management decisions on the site's values must be clearly identified and appreciated by the decision makers and stakeholders working together as one team. Only in this way will a viable site management plan that is relevant to local conditions be adhered to and implemented with success. Petra is a result of many layers of accumulated historical heritage, and it needs to be managed and presented in a manner that does not negatively impact its integrity.

Consolidation of the studies and their recommendations, with emphasis on the values that set Petra apart from any other heritage site and using an integrated approach (with the participation of those having a stake in Petra), is the shortest and most effective way to achieve this objective.

It is important to note that the concept of the establishment of protected areas and authorities to manage cultural heritage sites in Jordan is still under consideration. This requires thorough investigation and needs further scrutiny of the legislative aspects and deliberation on organizational considerations, in order to avoid the overlap in responsibility and authority that has been witnessed since the 1960s.

2.5.1 The Evolution of the Governing Bodies and Their Impact on Management Decisions

Throughout the 80 years of modern management of Petra, numerous governing bodies were developed and conflicting roles and responsibilities allocated. Between the years of 1934 and 1995, the management of Petra was located in Amman, under the DoA and MoTA. However, following the establishment of the PAP as a protected area in 1993 by a Council of Minister's Decree, a transfer in the location of management to the Petra region was seen. Over these 18 years, several successive governing bodies have evolved under mandates and laws allowing for financial and administrative independence. However, upon implementation, each of these bodies was faced with management conflicts, leading to their subsequent dissolution.

During the early stages, the management of Petra, as with other historical sites of Jordan, came under the governance of the DoA in Amman. The DoA had been established as an independent administrative and financial body under Law 24 in 1934. However, in 1988, through Law No. 21, the DoA came under the aegis of The MoTA. It was at this point that the management of Petra first came under two sets of laws: that of Law No. 21 of the DoA and the Tourism Law No. 20 of MoTA. Whereas Law No. 21 gave the management and preservation of the site to the DoA, Law No. 20 gave the Ministry of Tourism the authority to manage tourism sites; it also licensed campsites, provided visitor facilities, and issued

licenses for special uses, i.e., events, filming, etc. This inevitably resulted in the overlapping of responsibilities and basic understandings of the roles of the two Departments under MoTA.

Following the establishment of the PAP in 1993, the UNESCO Management Plan of 1994 was developed, recommending that a separate body be created to decentralize the management of the Park from Amman. It went further to suggest that this body report to the Prime Minister or the Royal Court. In compliance with the recommendations, in 1995, the Council of Ministers Decree (based on Article 13 of Law No. 79 of 1966) launched the PRC to manage the PAP from within the region—an area that covers 755 sq kms, of which 264 sq kms are protected. This body later came to be known as the PRPC.

The Decree provided for a board with the membership of senior staff from the Ministry of Municipal and Rural Affairs, Ministry of Tourism, DoA, Water Authority, Ma'an governorate, Ministry of Planning, and three independent specialists. It was under the title of "independent specialist" that the NGO PNT was able to be represented. Absent from representation was the local community. Then and now, decision-making in the absence of these communities is a prominent source of unrest.

The PRC was officially established to take on the responsibilities of the management of all the areas within the region. This included developing policies, overseeing urban development, zoning and licensing of construction, developing infrastructure and roads within the region and the protection of the environment. It was also charged with promoting a business environment, with the aim of integrating the local communities in development. Tourism development and the protection of the PAP were packaged into one article, with no clarifying details.

However, in giving the Council the mandate to govern the region and the PAP, the Decree disregarded the fact that the Law of Antiquities gives the DoA full authority to manage all aspects of the Park. Instead of streamlining the management of the PAP, it inadvertently prompted the overlapping of responsibilities, one of the major issues already identified in the UNESCO Management Plan. Herein lies one of the fundamental problems affecting the efficient management of the Park—the absence of a coordinating mechanism delineating the roles of the related governmental stakeholders and the appropriate location of this body within the government structure. As such, the PRPC was left solely with municipal functions, focusing on the licensing of construction and urban planning (most notably the start of the zoning projects).

With the failure of the Council to fulfill the role for which it was intended, the government issued the draft temporary Law No. 36 in 2001, which was later ratified as Law No. 15 in 2005, creating the PRA to replace the Council. The role of the PRA was to oversee the development and management of the region and the PAP, and it was to report directly to the Prime Minister instead of MoTA, as recommended in the UNESCO Management Plan. Unlike the Council, it was given financial and administrative independence.

The board was headed by a President, with representation from the Ministry of Tourism, DoA, Ministry of Planning, Ministry of the Environment, and the Petra

Lands Department, thereby encompassing the key governmental stakeholders under one decision-making body. In addition to the governmental stakeholders, the law stipulated that there should be equitable representation of the six main towns that surround the Park, and that the minimum qualification for participation was a bachelor's degree. In practice, however, the local communities were not invited to participate, creating a lot of discontent; on the rare occasion they were included, this was restricted to the members of the gateway town of Wadi Musa. It is noteworthy that PNT was omitted from participation. Despite the official omission, PNT was invited to become a member for the first 4 years. However, it was removed from the board when the law was enacted in 2005, as it was perceived as an obstruction to progress and development.

Yet despite the legislation providing for the independence of PRA, it was unsuccessful in eliminating the problem of overlapping responsibilities. Decisions relating to the Park, including licensing of developments within the Park, remained with MoTA, and the conflict between the Law of Antiquities and the policies of the PRA continued. This defeated the purpose of the establishment of the PRA and led to the creation of the next governing authority, the Petra Development and Tourism Authority (PDTRA).

In 2009, Law No. 15 was enacted, defining the PDTRA as a replacement for the PRPC and the PRA. Its mandate, like its predecessors, gave it the governorship over the entire region. However, this came during the implementation of the 6-year National Tourism Strategy, as sanctioned by MoTA in 2004. The strategy was developed by a USAID project, with archaeological tourism as its mainstay, yet it was carried out in the absence of a heritage strategy for the management and preservation of the archaeological heritage of Jordan. This resulted in PDTRA having a greater focus on tourism versus preservation inevitably tipping the delicate balance between heritage preservation and tourism promotion.

The PDTRA reports directly to the Prime Minister, manages the Authority, and oversees its affairs. Its governing body is the "Commissioners' Council," headed by the Chief Commissioner, who is assisted by four deputy commissioners: the Commissioner for Infrastructure Services, the Commissioner for PAP and Cultural Heritage, the Commissioner for Tourism and Investment Affairs, and the Commissioner for Community Development and Environment.

The new management structure for Petra was mandated with the responsibility of developing a comprehensive strategy and specific controls for protecting the Park. More specifically, its new role is the economic development of the Petra region, capitalizing on its potentials in tourism and other areas, such as improving the socio-economic conditions of the local communities, heritage management and protection, and the environment. For the first time, instead of the money accrued from entrance fees being returned to the Ministry of Finance, 35% of the total income from visitor entry fees was allocated to the PDTRA for development, and 10% of that to conservation.

The establishment of the PDTRA heralded a change in the management of the PAP and the Region. The PAP became a subordinate body that reports to the PDTRA. However, a by-law delineating the responsibilities of the PAP

Commissioner was drafted, but not enacted, leaving the roles of the PDTRA, the PAP, and the DoA elusive and subject to interpretation. In addition, Article 23 of the Law relegates the responsibility of conservation to the DOA and, as such, overcame the duplication of the two laws (15 for the PDTRA and 21 for Antiquities) in theory, but not in practice. The definition of what constitutes conservation remains vague. Also left ill-defined was the interrelationship between the commissioners, leaving questions such as whose responsibility it is to protect the environment of Park, likewise tourism management within the PAP, etc. Yet, in contrast to its predecessors, and in line with its mandate, the PDTRA became the single body that makes decisions, with no recourse to the MoTA.

It must be noted, however, that the Prime Minister announced recently that the status and location of independent commissions within the government structure—of which the PDTRA is one—are under reconsideration. Whatever the outcome of this decision, the underlying truth remains that, irrespective of the location of these governing bodies, the need to maintain an equitable balance between economic development, community development, and preservation must be adopted if the long-standing issue of heritage management in Petra is to be resolved.

In conclusion, archaeological heritage management of historical sites in Jordan has been a concern for almost five decades, with Petra being the focal point. Since the establishment of the PRPC in 1995, there has been a basic consensus in the government that there is a need to explore innovative approaches to site management, though this has been prompted more by economic factors than by urges towards preservation and protection. This, in turn, led to the numerous models reviewed above.

Instead of developing a unified park policy throughout the country, models were selected, including those at Petra. This resulted in overlapping responsibilities, duplication of work, and the ultimate fragmentation of the role of the DoA. Engaging partnerships with non-governmental organizations, archaeological missions, and academic institutions, where expertise exists, have been inconsistent. The management of sites remains centralized within the government and associated commissions and authorities, which have no intention of relinquishing authority or establishing public/private partnerships. In addition, several stakeholders, most notably the local community, were and continue to be overlooked, inevitably leading to a non-integrated approach to the management of non-renewable heritage resources.

There is a definite and urgent need for the parties concerned to come together to consolidate the numerous studies and their recommendations; to reevaluate the role of the DoA and its relation to the Ministry of Tourism, as well as its role vis-à-vis the geographical regions within the country; to assess the management models adopted; and to emerge with an integrated nationwide policy for the protection of archaeological sites. A clear-cut strategy for the management and preservation of sites must be developed for all sites. The integrated approach being put forward here is that of active participation of both governmental and non-governmental organizations, as well as the public sector and the public.

2.5.2 Old and New Management Issues

Threats to Petra are divided into two categories:

- Natural: i.e., geological structure, rain, wind, seismic activity; and
- Unnatural: i.e., human impact.

Although both of these have notable negative impacts on the PAP, this chapter will focus on the threats caused by human impact, drawing on key issues identified in the UNESCO Management Plan of 1994 as well as in other management plans. The state of natural impacts and conservation will be addressed under a separate section.

1. Management Deficiency

As stated in the UNESCO Management Plan of 1994, “Many government departments and other institutions are responsible for the site and its surrounding environment. There is no efficient mechanism to manage the PNP (now referred to as the PAP) and coordinate inputs. Most of the underlying problems are a consequence of such a situation” [3].

The PDTRA attempted to resolve this issue by detaching from MOTA and establishing itself as a separate entity that reports directly to the Prime Minister. Unfortunately, this separation has only amplified unilateral decision-making and built a greater wedge in collaboration/coordination/communication between the PDTRA and other government stakeholders, who are impacted by PDTRA’s unilateral resolve. There is an urgent need to review the laws and the relationship of the PDTRA universities, international heritage organisations, the private sector, local communities, NGO’s etc.

As detailed in previous sections, the Park continues to function in the absence of a formal zoning plan, plans for development, site presentation, visitor management plans, policies, and day-to-day regulations for the management and monitoring of the Park. The continuation of this situation will inevitably have a detrimental impact on the integrity of the Park and buffer areas.

In a recent attempt to rectify this situation, and after much deliberation over the past years, the Director General of Antiquities recommended the establishment of the advisory committee, in accordance with Law No. 36, of 2009, of the PDTRA. The members recommended come with backgrounds from heritage management and conservation specialists from the Government, NGOs, universities, UNESCO, and international archaeological missions that work in Petra. In general, the purpose of the advisory committee is to develop conservation and monitoring strategies, to raise funds, and to coordinate with related international organisations. It fell short in not giving the Committee the mandate to deliberate on other matters that have an impact on conservation and preservation, like reviewing proposed development projects in the Park and the buffer areas, special uses, carrying capacity, visitor management etc., which have a very high impact on the conservation and integrity of the Park. The Committee to this date has not been formed.

2. *Urban Encroachment*

The UNESCO guidelines for operations recommend that protected parks have a clearly delineated buffer zone surrounding the PAP, with zoning regulations that determine the type and extent of building and construction development. The UNESCO Management Plan of 1994 states that “Besides the band of new hotels, the catchment areas (Wadi Musa, Um Seyhun) encroach on the area of influence of the site and are year after year more visible from it. Um Seyhun expansion, blocked to the south by the archaeological site, and to the north by surrounding land traditionally cultivated by other tribes, is increasingly of concern [3].

The UNESCO Reactive Mission to Petra conducted in December 2010 states that “The unregulated expansion of settlements near the property is so intense it has harmed its environmental landscape [4].” It states that Wadi Musa, the main gateway town to the PAP, is where the most negative impacts of uncontrolled construction development “of relative aesthetical quality” [4] are occurring. In the buffer areas, the government successfully imposed a moratorium on building hotels in addition to the five existing in areas overlooking the PAP. More recently, over the past two years though licenses are being issued once again. Building in the vicinity of the site has continued. Most of these lands belong to the government, and it is government structures that are constructed for the main part (e.g., the PDTRA and the Youth Centre). There is continuous pressure on the PDTRA to allow the construction of government offices in this area that has thus far been averted.

What was not averted, however, is the awarding of the construction, in 2009, of a Sixth Sense hotel in the “Dara” area. The project will consist of 100 bungalow-type hotel rooms, a conference facility able to accommodate 400–600 persons, a museum, and hotel-associated retail outlets and restaurants. The Dara area was earmarked by Dar al-Handassah in 1996 to remain a green area, with no development, under a World Bank project. The zoning was revised in 1997, through negotiations between the Bank and the Government of Jordan, to allow 25% restricted environmentally friendly development, i.e., vernacular architecture and one-storey buildings. Dara lands were originally owned by 284 citizens and consist of a total area of 69 donums. The PRA acquired 61 donums, i.e., 88.4% of the total area, in 2003, with the aim of protecting the area. The balance remains privately owned, with owners refusing to sell, and the project to date has not been implemented. The Jordanian NGO, PNT has been consistently advocating for the construction of a one-floor shopping village, where local crafts could be sold and stalls rented to local owners, and a small open-air theatre for local performances and documentaries and a small museum to house the finds from the excavations undertaken in Petra could be located. The intention is to reduce the pressure that the shop owners impose on the Park, but the relocation will also allow visitors to undertake their tours without distraction or harassment by vendors. Developing Dara in this manner would also give visitors something to do after they complete their site visit. This golden opportunity was lost in favor of a very sophisticated development.



Fig. 2.14 Bulldozer levelling area for terracing, 2007 (Courtesy PNT)

In 2007, there was an attempt by the PRA to rehabilitate the old terraces in the Dara area, albeit without conducting an EIA. While doing so, significant archaeological remains were damaged. In light of this new information, the Dara area should be preserved, since it is a sensitive archaeological zone, as is clearly evident from the pictures (Fig. 2.14, 2.15, 2.16, 2.17). As recommended by the UNESCO Reactive Mission of 2010, “the Dara area should be included in the buffer zone being immediately adjacent to the Park boundaries at the entrance of the property” [4].

There are a number of areas surrounding the PAP where urban encroachment is clearly evident. Um Seyhun is a glaring example of this phenomenon having a very high negative impact on the Park (Fig. 2.18). It houses the Bdul tribe, who were relocated from the Park in the 1980s. Expansion of this town has penetrated the boundaries of the Park, and the negative impacts of urban development around the property are gradually eroding and impairing the environmental setting of Petra, thus having an adverse effect on the visual integrity of the property. In 1999, plot No. 703 (17 donums), which is directly adjacent to the Wu'eira Castle and overlooks the PAP, was allotted by the Land and Survey Department to a family from the region to develop as a tourism facility. The land forms a natural extension to the Park boundaries, but was not included within for reasons that are unknown. It has a very high impact on the Park. The allotment was objected to by the PRA and the DOA, and it is a clear example of overlapping responsibilities. This plot of land should be returned to the Park and be included within Park boundaries. Recently, UNESCO has undertaken a project to delineate the boundaries of the

Fig. 2.15 Nabataean terracotta pipe (main Wadi Musa network) damaged by bulldozer, 2007 (Courtesy PNT)



Fig. 2.16 Nabataean altar stone damaged by bulldozer, 2007 (Courtesy PNT)



PAP and to recommend buffer zones. Efforts to control construction and development in susceptible areas have been circumvented over the years due to the fear of escalation of unrest amongst the local communities, who together with the private sector own these Miri Lands.

The restriction of development is not an easy rule to impose, both upon a tribal society and upon other land owners who have purchased these lands in the hopes of developing them for tourist purposes. With this in mind, the PDTRA has allegedly advised both UNESCO and the international consortium ATS against the delineation of buffer areas.

There is a need for the Government to find a formula that heeds the requirements of the local communities while maintaining the integrity of the property. A rigorous awareness campaign and public meetings should be launched by the PDTRA if this is to be achieved.



Fig. 2.17 Overview of Dara area, 2009 (Courtesy PNT)



Fig. 2.18 Expansion of construction in Um Seyhun, within Park boundaries, 2009 (Courtesy PNT)



Fig. 2.19 Overcrowding at entrance to Siq, 2009 (Courtesy PNT)

3. Carrying Capacity and Visitor Management

Carrying capacity levels at World Heritage sites are set with the objective of sustaining the desired resource and social conditions that complement the purpose of the Park, its management objectives, the significance of the site, and the quality of the visitor experience. The carrying capacity of the Petra site, as set by UNESCO's Petra Management Plan, is 1,500 visitors per day. Visitation figures escalated dramatically after Petra was listed as one of the New Seven Wonders of the World in 2007. In 2010, the figures jumped to 2,740 per day, on average and, at times, exceeded 5,000 per day, more than tripling the carrying capacity of the Park, which inevitably led to congestion and bottlenecks in some areas (Figs. 2.19, 2.20, 2.21). Promotional campaigns with the objective of increasing the number of visitors to Petra were, and continue to be, conducted without taking the carrying capacity into consideration, with the ultimate outcome of negatively impacting the visitor experience due to overcrowding. With monitoring procedures not in place, it is difficult to estimate the extent of the damage on the monuments is occurring. During the period when Petra was being promoted as a New World Wonder, thousands of people were allowed into the Khazne (Figs. 2.22 and 2.23) and Theatre (Fig. 2.24) areas. Both these areas have been cordoned off because of the high level of erosion, yet they are used for promotional events and as such visitors still get in without being deterred.

Exacerbating the situation is the absence of a visitor management system in place to help manage and monitor the number of visitors within the Park at any given point in time. At the moment, no regulations or directional signs to paths and



Fig. 2.20 Overcrowding at Bab al-Siq, 2009 (Courtesy PNT)



Fig. 2.21 Overcrowding in Khazne courtyard, 2009 (Courtesy PNT)

monuments exist, and visitors move uncontrolled throughout the site at their own risk. The number of park rangers and tourism police is not sufficient to provide adequate surveillance of visitors. Search and rescue procedures are not in place,

Fig. 2.22 Hot air balloon promoting the New Seven Wonders of the World in the Khazne courtyard, 2007 (Courtesy PNT)

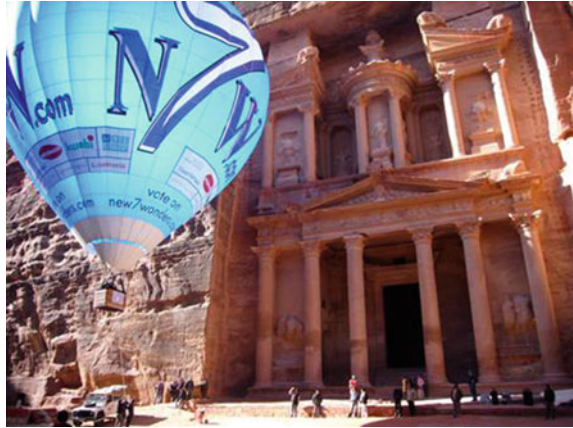


Fig. 2.23 Rally for the New Seven Wonders of the World in Khazne courtyard, 2007 (Courtesy PNT)



and many accidents are results of this circumstance. The UNESCO Reactive Mission to Petra in December 2010 addressed this issue and also reported about the issue of safety of visitors, the lack of which has resulted not only in injuries, but also in death. In the early 1960s, 22 French tourists were killed as a result of flash floods in the Siq. Precautions against flash floods have since been taken under a World Bank project and, later, by the PNT, which undertook extensive measures to mitigate the impact of flash floods. Other fatal accidents in later years took place in other areas of the Park. To date, there is no trail system that is implemented, and no information about risks that exist in the site is provided to visitors. While there is an ambulance and a first aid post, there is further a need to develop integrated plan for the safety of visitors and to train rangers accordingly.

Currently, PAP is served by a single entry/exit route through the Siq. With the aim of increasing the number of tourists, the PDTRA is now studying the use of a two- point entry/exit route, that of the Siq and the Turkomania road, as well as the

Fig. 2.24 Rally for the New Seven Wonders of the World in the cordoned-off Theatre, 2007 (Courtesy PNT)



introduction of a shuttle system. Visitor access to the site through Turkomania road will encourage longer stays at Petra by making it easier for the visitor to revisit the site through the City Centre and the western part of the historic area. Nonetheless, providing access via Turkomania Road is not without threat to the integrity of Petra. It requires that all the management requirements stated in the management plans and a monitoring system are in place prior to its launch, and there is a lot that remains to be done in this respect.

In the meantime, the PDTRA has engaged a company in the private sector to conduct Environmental Impact Assessments (EIAs) to review the different types of impacts that this service has on the site. Prior to obtaining the result of the EIA, however, it informed the local communities of its intention that the fees from the use of the shuttle service will be distributed amongst the communities. It also linked this service with the steep hike of the entrance fee to US \$ 70 in the case multi-day visitors to Jordan and \$ 90 for day trippers. Such preemptive announcements in the absence of the EIA results have rendered the decision to use the Turkomania road almost impossible to reverse should the results of the EIA not be compatible with the internationally accepted conservation standards.

In order to maintain the universal values for which Petra was inscribed on the World Heritage list, there is an urgent need that the carrying capacity study be updated after a final decision, following the EIAs, is made about the use of the two entry/exit road; that a trail system based on the archaeological, biodiversity, and geological heritage and resources of Petra is developed; that trained rangers are in place to manage visitor movement and to ensure visitor safety; and that a site monitoring system is in place and implemented.

4. Site Presentation and Visitor Services

The objective of 'site presentation' is to enhance the quality of visitor experience, access to information, provide services, and to ensure a safe and enjoyable Park experience. To increase the length of stay of tourists depends largely on the level of services available and the extent to which historic sites are presented and made accessible to the public. Effective preservation and presentation is vital, both

to preserve Petra's historic past and ensure that it can be enjoyed, understood, and appreciated.

In June of 2008, USAID under the Jordan Tourism Development Project (JTDP/Siyaha 1) funded the Interpretive Plan for the PAP that was developed by Dr. Douglas Comer.

The plan is very extensive and provides details on desired visitor experiences and proposes themes to highlight the different historical periods and values.

Petra, Jordan's most important archaeological site that has been inhabited since prehistoric times. It is most renowned as a Nabataean caravan city that was for several hundred years the most important location in a trading network that covered Arabia and Syria. By dominating the transportation of spices and incense to ports on the Mediterranean and via land routes to Asia Minor, it became, 2,000 years ago, one of the richest cities in the world. Petra is half-built, half-carved into the rock, and is surrounded by earthquake-riven mountains full of striking narrow canyons and splendidly colored sandstone formations. Within the boundaries of PAP are remarkably preserved ancient structures and monuments of enormous aesthetic and historical value, as well as subterranean archaeological sites that contain invaluable information about the ancient world.

It not only contains archaeological sites, but is also a rich natural terrain that itself has played a strong role in the selection of the area by humans for many different types of habitation, as well as beautiful flora and fauna, some of which are found almost nowhere but the Park.

Two events caused spiking in the visitor numbers to Petra, one being the signature of the peace agreement with Israel in 1994 and the second when Petra became one of the New Seven Wonders of the World on 7 July 2007. Visitation figures jumped to 68% between 1993 and 1994, and 62% between 2006 and 2007. The latter while providing recognition to the uniqueness of Petra, generated the influx of tourists, which, coupled with the absence of effective planning and management, necessitates urgent action to protect Petra's cultural and natural heritage on the one hand and to upgrade tourism services to meet high visitor expectations on the other, which needs immediate institutional development to become operational.

A number of positive steps have been taken in terms of developing some trails, signage, providing tourism services, and the rehabilitation of the existing Visitor's Centre that is currently taking place, however, a more holistic approach is required in developing these extraordinary resources to meet with visitor satisfaction while maintaining site preservation and integrity.

Unfortunately, however, as the Plan states "the numerous visitors are inadvertently damaging the resources of the park. As an example, simply touching carvings on tombs and canyon walls, as is done at present by hundreds of thousands of visitors each year, is leading to their gradual destruction. Visitors sometimes ignore signs prohibiting entry to certain areas, such as the Roman Theater, where longitudinal monitoring studies have established the loss of most of the maker's marks on masonry in just one decade because of visitor use. People sometimes take away with them archaeological items and antiquities simply because they have not been made aware that this may provide a motivation for others to loot archaeological sites, and will result in the consequent destruction of



Fig. 2.25 Cave in Basin area used for storage of restaurant chairs, 2004 (Courtesy G. Palumbo)

context upon which much of our knowledge of the ancient world depends [2].” On a number of occasions, visitors have been injured, and sometimes killed, because they had not been given information necessary to enjoy the park safely. Although under separate USAID contract 70 Park Rangers have been trained by the US National Parks Service specialists in this field, however, their effectiveness has been rather limited due to a number of management related factors. Visitors are also not aware of the physical demands of the site, situated as it is in an area having a very rough terrain and a climate that can be extremely hot, cold, or windy, and at times producing flash floods. Overall, information guiding visitors is not readily available.

In terms of site presentation and tourist facilities 30 toilet structures with a total of 75 units, 35 vendor shops, 1 ranger post, and 2 police kiosks have been erected and in some cases constructed, however, their location and design leaves a negatively impact on the aesthetic nature of the site and its integrity. Left exposed throughout the Main Spine are water tanks, diesel generators, abandoned fuel tanks, and piles of different materials that are stored in caves and visible to the visitor (Figs. 2.25 and 2.26). Many of the restaurants that were in tents in the past have now been combined to form three restaurants, but they too are now expanding and encroaching on the cultural landscape of the Basin area, the intersection point of several Wadis. All these developments were undertaken in the absence of EIAs. More recently, four new toilet structures were constructed. The structures are monumental in size and have a highly negative visual impact on the archaeological landscape (Fig. 2.27). The World Heritage Centre on two occasions has written to the DOA and Park Commissioner asking for the removal of these latest structures.



Fig. 2.26 Use of cave as shelter for diesel generator—note oil leakage, 2004 (Courtesy G. Palumbo)

Other factors that impact site presentation include vehicular circulation (Fig. 2.28) within the archaeological area of the Park, the presence of different generations of signs, inappropriate garbage disposal bins, illegal vending, and generators. A study is currently underway to replace the diesel engines with solar energy.

New designs for the existing Visitor's Centre have been produced and approved by the PDTRA. The design for the entrance to both the Visitor's Centre and the Park is monumental and incompatible with the cultural landscape and aesthetic value of the site. Dr. Werkmeister, participating in the 1980 UNESCO Reactive Mission, recommended in his mission report that, "even if conscious of visitors' needs, "architects must look for solutions without creating disturbing impacts on the townscape of ancient Petra [4]." However, in spite of repeated recommendations, considerable modifications of the archaeological landscape have taken place." There is an urgent need to revisit the number, design, and distribution of visitor services and to develop a holistic plan for all tourism-related services. The USAID-funded JSTD/SITES project in 1996 presented a holistic overview of how the site should be presented, which should be referred to in this endeavor.

5. *Vandalism and Theft*

There is considerable evidence of acts of vandalism (Fig. 2.29) and theft throughout the site. An example of a locale that clearly shows both types of



Fig. 2.27 New toilet facility in Basin area, 2011 (Courtesy PNT)

Fig. 2.28 Vehicles circulate in Royal Tombs area (Courtesy PNT)



activities is Biclinium No. 849, which holds the most important surviving Nabataean wall paintings. They are unique and fragile. Damage to the paintings has been extensive and severe, including a number of theft attempts, which, we know from photographic evidence, actually occurred sometime after 1986—probably as late as 1990 (Fig. 2.30). The paintings have also been a target for much graffiti, including incisions and carvings (Fig. 2.31).

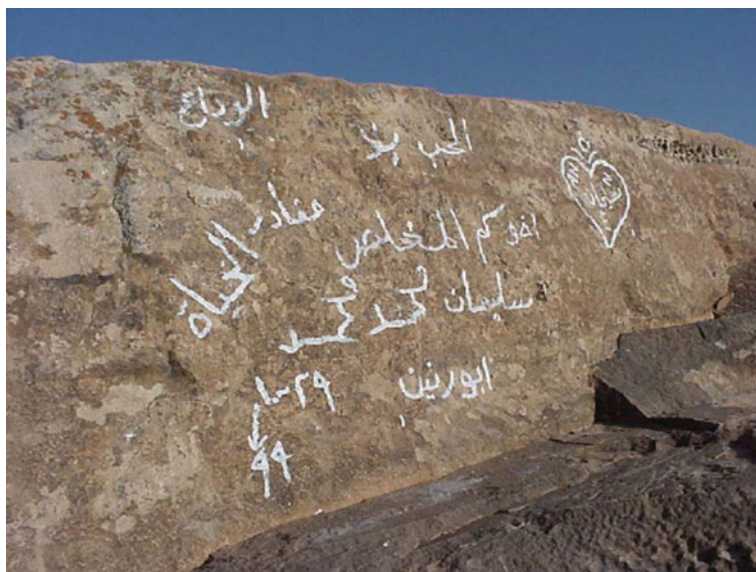


Fig. 2.29 Graffiti, 1999 (Courtesy PNT)



Fig. 2.30 Example of an unsuccessful attempt at theft of a wall painting in Biclinium 849 in the 1980s (Courtesy PNT and Courtauld)



Fig. 2.31 Close-up of graffiti in Biclinium 849, east wall (Courtesy PNT and Courtauld)

These paintings were cleaned and consolidated by the Courtauld Institute of Art, as part of a PNT project, between 2006 and 2010. Evidence of the latest attempts at vandalism and theft damage in the biclinium show (Fig. 2.32):

- Damage inflicted in the area of the central medallion of the vault between December 2008 and June 2009;
- Loss of several small areas and one large area of painted plaster;
- Chiselling away of lower plaster layers in areas of previous intentional damage and elsewhere around the perimeter;
- Chisel damage to the stonework, mainly around the central hole, and;
- The orientation of the chisel marks indicates that the perpetrators are likely to have had very good access to the vault, enabling them to position tools parallel to the surface of the exposed stonework to prize off sections of the perimeter plaster.

All the evidence points to intentional damage, with a fairly high degree of planning involved: the perpetrators are likely to have worked from ladders or platforms, using metal tools. A similar attempt in the recent past (prior to December 2006) suggests a specific purpose (possibly treasure-hunting), while the lack of debris on the floor of the recess suggests that those responsible removed the evidence of their activities, as the damage was wholly confined to the area of the central medallion. For all these reasons, opportunistic damage and casual

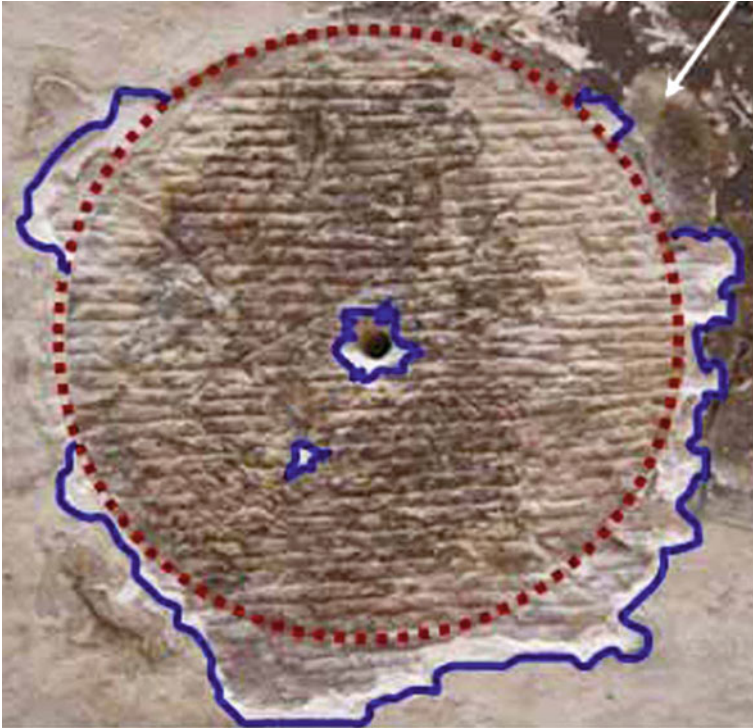


Fig. 2.32 Attempted theft of central medallion in Biclinium 849, 2009 (Courtesy PNT and Courtauld)

vandalism can be ruled out. It is clear that the security measures currently in place are inadequate to protect the site.

The team of Courtauld specialists did prepare alternatives designed to improve security for consideration, but instead of taking one of the suggested alternatives, the PAP resorted to extending the existing door, which consists of a grille installed in 1986. In addition to its failure to provide adequate protection and security, the grille is crudely fixed into the carved stone support of the recess and biclinium south wall. The fixing points partly conceal important evidence of an original frame that decorated the recess entrance. Furthermore, the two brackets that were fixed into the floor are causing damage to the stonework (Fig. 2.33).

In 1986, a metal gate was installed across the painted recess to protect the areas of figurative painting there. However, no protection was provided for the masonry pattern painting on the south wall of the biclinium that is an integral part of the same scheme. The security of these unique paintings and measures to protect them from vandalism and theft need to be taken.

Graffiti, which in the Park dates back to the Islamic Ayyubid and Memluk periods between the eleventh and fifteenth centuries A.D., continues today. Evidence of graffiti from the former period can be found in Jebel Harun and Um

Fig. 2.33 Damage to stonework due to fixing of grille to wall in Biclinium 849, 2010 (Courtesy PNT and Courtauld)



al-Biyyara, while the most recent example noted is signed and dated and is located on the southern wall of the Siq (Fig. 2.34). Illustrations of graffiti can be seen, not only on bedrock, but inside and outside of monuments. Another very damaging practice exercised by the local vendors and their children is the sale of rocks chipped off of the bedrock to obliging tourists! Despite the numerous persons in the PAP responsible for safeguarding the site, acts of vandalism and other irresponsible behavior (Fig. 2.35) continue to be perpetrated by both local and international visitors. There is no information at the Visitors' Center about do's and don'ts, and that needs to be part of the orientation for visitors. Considering the vastness and complexity of Petra, the present measures for the monitoring of visitor behavior need to be enhanced.

6. *Special Uses*

The UNESCO Management Plan states that the only type of commercial activity that could be compatible with a World Heritage Site is that which draws its inspiration from intrinsic cultural values and uses the site as a powerful background to enhance and make its cultural message more easily understood. Staging an event unrelated to the character and history of the site, it states, would considerably detract from the significance of the site, compromise its international

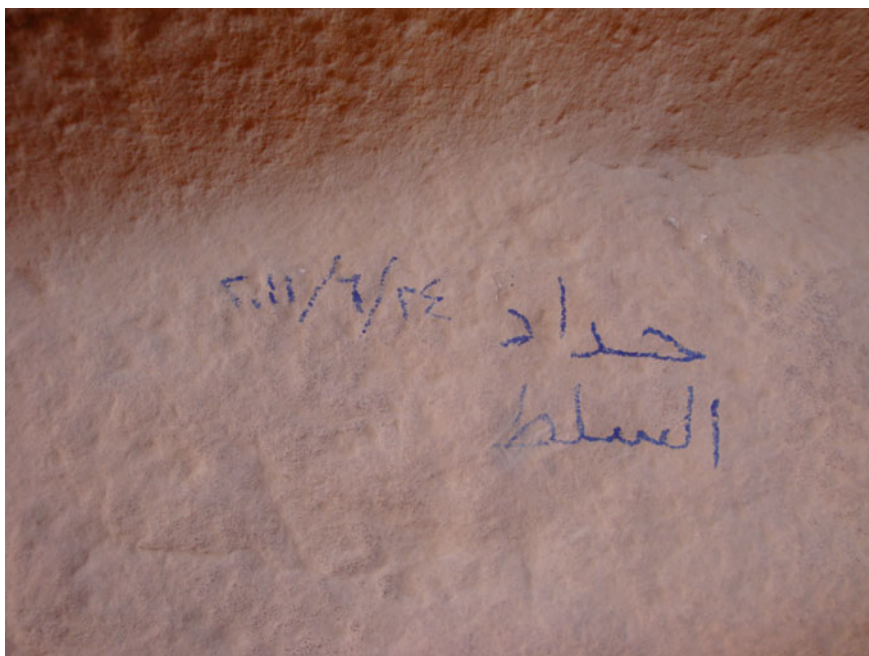


Fig. 2.34 Recent graffiti in the Siq, 2011 (Courtesy PNT)



Fig. 2.35 Tourist using walking poles with sharp nibs, 2010 (Courtesy PNT and Courtauld)



Fig. 2.36 Event at Siq al-Barid entrance celebrating the 3rd anniversary of Petra's selection as one of the New Seven Wonders, 2010 (Courtesy PNT)

reputation, discourage potential interested visitors from coming, and, possibly, cause irreversible damage to the physical integrity of the site.

Special uses include the staging of events in Petra (i.e., private dinners, marathons, music raves, concerts, performances, filming, camping, etc.) conducted in the absence of zoning, regulations, and guidelines that determine relevancy to site significance and integrity and that monitor these events. These activities, more than simply detracting from site significance, can cause irreversible damage to the monuments and environment of Petra. A draft zoning plan was developed as part of a larger draft interpretation plan in 2008, as part of a USAID project. An analysis of topography and landscape, significant or sensitive resources, and potential visitor use attributes was conducted. Locations where these factors naturally grouped together were mapped and developed into zones. Within the Petra Sanctuary, nine zones were identified. The zoning plan, however, covered only the spine area of the PAP leaving other sensitive areas without zoning. To date, this plan has neither been shared with stakeholders, nor adopted or implemented. The Beidha area, which is equally fragile as the Main Spine area, remains un-zoned, and it is used extensively for commercial and private events, in the absence of monitoring of the potential impact of such events on the site. Increasingly, interest is developing in trekking and hiking, which also takes place in the absence of zoning, a trail system, sign posting, safety procedures, etc. Although there is some awareness of the harm that these activities cause, allowing them to occur is largely motivated by profit driven policies and commercialization (Figs. 2.36, 2.37, 2.38). All events falling under the category of special uses are conducted in the absence of EIAs and monitoring procedures.

Fig. 2.37 Starting point of Petra Marathon 2009 in the Khazne courtyard (Courtesy PNT)

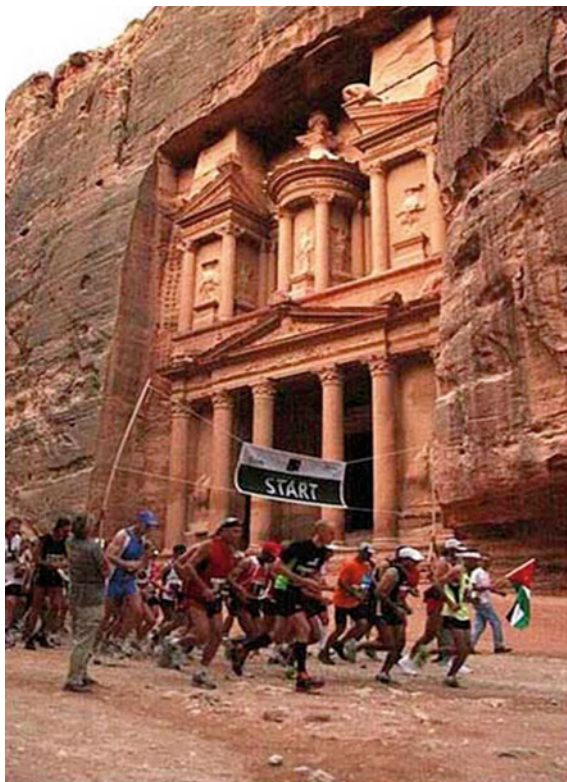


Fig. 2.38 Backdrop using paint for commercial filming purposes, 2005 (Courtesy PNT)

There is an urgent need to develop a zoning management plan for the entire protected area of 264 sq km and to develop the same for the areas with a high density of archaeological monuments that are frequented by visitors (i.e., the Main Spine and the Siq al-Barid, as well as the excavations in that vicinity). Guidelines and procedures to determine appropriate uses of the sites within the various management zones require development, and a standard EIAs need to be adopted. EIAs need to become an integral part of any management decision that sanctions developments or the licensing of activities. Until these requirements are in place, every effort should be made to stop the licensing of events. In the meantime, events must be studied on a case-by-case basis by the PDTRA advisory committee. In conclusion, despite witnessing severe conservation issues, among others, the UNESCO Reactive Mission of 2010 stated that, while PAP continues to represent an exceptional asset with its Outstanding Universal Value thus far maintained, it also highlights that the state of conservation, in addition to the modifications to the landscape, has severely affected the integrity of the World Heritage Property.

2.5.3 The Role of NGOs in Site Management

Non-governmental organisations (NGOs) have been in existence in Jordan since 1966. The focus then was on natural heritage, and the first NGO established for this purpose was the Royal Society of Conservation of Nature. It, in contrast to all other NGOs, owns and manages six natural parks successfully. Twenty-three years later, in 1989, the first national NGO whose focal point was archaeological heritage preservation—the PNT—was established. The Friends of Archaeology was established in 1990 in Amman, and it focused on awareness and introducing Jordanian and non-Jordanians alike to the archaeological heritage of the country. It, however, did not work in Petra. The NGO “Bait al-Anbat,” based in Petra, was established in 1997, and its focus as stated on its website is the development of cultural life in Jordan, to raise awareness of cultural heritage, and to develop improved dialogue among civilizations. There are numerous other NGOs working in the fields of socio-economic development, education, special education, handicrafts, and others, all located in and around Petra.

PNT is the only cultural NGO that has been actively involved in the preservation and protection of the archaeological, natural, and cultural heritage of Petra, and, as such, it is a pioneer. Over the years, it has been active in two main areas: advocacy and the preservation of the archaeological heritage within and outside the Park. In its work, it maintains a close relationship with both related Governmental bodies and international organisations. PNT played a pivotal role in the creation of the PAP in 1993, and, in 1995, it was instrumental in the implementation of the UNESCO recommendation to decentralize the management of Petra and to bring about the creation of the PRPC. In 2007, it was involved in the creation of a separate independent entity under the aegis of the DoA.



Fig. 2.39 Petra Junior Ranger Programme role-playing activity, 2011 (Courtesy PNT)



Fig. 2.40 Petra Junior Ranger Programme habitat creation activity, 2011 (Courtesy PNT)

Fig. 2.41 Petra Junior Ranger Programme Nabataean pottery painting activity, 2011 (Courtesy PNT)



Consequently, it helped resolve the controversy regarding which government body ultimately was to be responsible for the management of archaeological sites. This decision, as mentioned earlier, was reversed in 2009, with the conception of the PDTRA, when the Park became a subordinate department to the PDTRA. Throughout these 23 years, PNT has been vigorously advocating against the introduction of developments that will have a negative impact on the integrity of the Park. Many a disaster has been averted through its relentless efforts. Very recently, the Trust launched the Junior Ranger programme, which consists of workshops for youth between the ages of 7 and 15 (Figs. 2.39, 2.40, 2.41). The programme aims to help youth identify with their heritage and understand Petra's outstanding values and the need to preserve and protect its integrity.

In its role as a preservation organization, PNT has executed a number of preservation projects in the fields of hydrology (Fig. 2.42), biodiversity (Figs. 2.43 and 2.44), conservation of wall paintings (Figs. 2.45 and 2.46), and local community development. In the carrying out of these projects, PNT partners with the government and conservation specialists in the private sector.



Fig. 2.42 Overflow in Qantara Dam, 2004 (Courtesy S. Farajat)



Fig. 2.43 Biodiversity of Petra—*Solanum luteum* (Courtesy PNT)



Fig. 2.44 Biodiversity of Petra—*Pseudotrapelus sinaita* (Courtesy PNT)



Fig. 2.45 Siq al-Barid wall painting before cleaning, 2006 (Courtesy PNT & Courtauld)



Fig. 2.46 Siq al-Barid wall painting after cleaning, 2008 (Courtesy PNT & Courtauld)

Thus, there is some recognition by the government for the need to explore innovative approaches to site management and to allow NGOs to participate; however, it has been inconsistent in its approach to these issues. This, to a great extent, is due to the traditional centralized *modus operandi* of the government bureaucracy, coupled with a lack of understanding of the role of NGOs in heritage management. The advocacy role of NGOs is perceived as threatening, which exacerbates the situation further. A better understanding of the roles of each of these two stakeholders, with the aim of achieving a more complementary partnership in the field of site management, is the most effective way forward. NGOs, unlike the government, are in the unique position of being nonprofit and, therefore, not motivated by economic gain; at the same time, they are not overburdened by bureaucracy, which gives them the ability to operate effectively.

Acknowledgments I would like to thank PNT intern, Maya Bahoshy, and staff member, Ghadeer Khayyat for patiently reviewing the chapter.

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Author Biography

Aysar Akrawi has occupied numerous senior positions in management and development covering a broad range of fields. Over a period of 10 years in the 1970s, she occupied the position of Director of the Queen Noor College for Civil Aviation in Amman. During her tenure the College saw substantial expansion in the various fields of aviation specializations and in capacity building of the teaching staff. In the 1980's, A. Akrawi headed a team of specialists to develop entrepreneurial skills by establishing and developing an industrial garments factory for rural women in the town of Mafraq in the North of Jordan.

Since 1994 to-date, A. Akrawi has held the position of Executive Director of the Petra National Trust (PNT) for 17 years. In this capacity her role has been the implementation of the mission of the Trust in promoting and coordinating Jordanian and international efforts to preserve the unique combination of antiquities, natural environment, and human tradition in the Petra region. Over the years A. Akrawi has been a vigorous advocate for preservation the outstanding values for which Petra was inscribed on the List of World Heritage sites. During her tenure The PNT undertook 22 projects in preservation, outreach, site presentation, site management, and biodiversity. To highlight but a few, PNT between 1996 to-date conducted studies followed by the implementation of projects for the protection of visitors and the monuments in a number of sensitive areas i.e. the Siq, Siq al-Mudhlim and the Khazne where deaths and a lot of damage occurs as a result of the phenomenon. In the period between 2006 and 2010, PNT in co-ordination with Department of Antiquities of Jordan a team of specialists from the Courtauld Institute of Art, London, UK, PNT undertook the cleaning, consolidation, and preservation of the unique paintings in biclinium No. 849 in Siq al-Barid, which were in an advanced state of decay. Between the years 1994 and 1996 PNT conducted a survey of the biodiversity of Petra and in 2006 published a field guide to the flora and fauna of Petra. In 2010 PNT has added to its portfolio a programme for youth awareness “Explore, Learn and Protect Petra: Petra Junior Ranger Programme” with the objective to develop a sense of belonging, identity, pride, and responsibility among children between 7 and 15 years towards protecting their cultural resources. The programme will be expanded to implement a diversity of youth engagement programmes.

Part III
Summary and Evaluation of Conditions
Within the World Heritage Site
and in the Environs

Chapter 3

Architecture and Deterioration in Petra: Issues, Trends, and Warnings

Thomas R. Paradise

The ruined city of Petra is situated in a deep valley, surrounded by steep, impassable sandstone walls and winding gorges, within the arid expanse of Jordan's great southern desert. However, it is the spectacular architecture, rather than its beautiful setting, that has drawn international attention and visitors since it was first "discovered" and described to the Western world by Burckhardt [2]. Although its structures and archaeological evidence indicate occupation in the Petra area since 7,000 BCE, it was its Nabataean occupants and Roman clients that gave Petra notoriety, then and now. These residents worked the valley walls into simple, elaborately carved tombs and spaces, hewn directly from the reddish brown and yellowish sandstone cliffs; many exceed 50 m in height. Since the construction 2,000 years ago, natural and anthropogenic forces have been working to weather this delicate and unique sandstone and limestone architecture.

Since Burckhardt's day, Petra has become a popular tourist destination, witnessing as many as 6,000 visitors a day. Visitors have increased from 100,000 in 1990, to 200,000 in 1994, to an astounding 800,000 in 2008. Despite regional conflict and instability, Petra's visitor numbers continue to rise, and, judging from recent research on the anthropogenic influences on the deterioration of the architecture, Petra's decay is thus accelerating. Petra represents an ideal outdoor laboratory for sandstone and limestone deterioration research; the structures have a known exposure, the sandstone lithology and conservation attempts have been documented, and Petra is situated in a region that has seen relatively little climate change since its construction 2,000 years ago. So, as tourism grows across the Valley, it has been observed that human-induced decay and surface recession is accelerating, and in-tomb humidities are also increasing. Since the 1990s, a long-term project has been underway to determine deterioration as a function of increased visitation in the valley, all in the hopes of slowing the decay of this magical, ruined city. This chapter will address research in Petra, Jordan, that attempts to answer questions of architectural deterioration, its effects, and the often-destructive nature of humans in Petra and abroad.

3.1 Science, Policy, and Mitigation of Deterioration

Weathering studies have separated weathering influences into two distinctive categories: those affected by the characteristics of the stone itself, or *intrinsic* effects (i.e., lithologic constituents, fractures), and those affected by external influences or *extrinsic* effects (i.e. climate, human contact). The decay of Petra's sandstone architecture can be similarly identified as those surface features related to variability in rock composition and/or caused by running water, human touch, etc. Studies have emphasized the importance of intrinsic agents like rock composition and integrity, but recent research indicates that extrinsic influences, like climate and human contact (tourism), can be even more important and devastating.

The previous work has been crucial in our understanding of environmental influences on stone decay mechanisms in Petra. In his early observations, Stephens [16] postulated relationships between humidity and stone decay on both geological and architectural surfaces, even pondering whether his presence (and breath) affected these features. However, it would be the catalog of Petra's tombs, monuments, façades, and structures, undertaken by Brünnow and von Domaszewski [1], that represents the earliest recorded descriptions of Petra's architecture and condition. Since then, however, few papers have addressed the relationship between sandstone weathering and tourism in Petra.

Research in arid regions has established important relationships between the deterioration of architecture and its influences. These natural influences include lichens (i.e. [10], case hardening (i.e. [3], tafoni development (i.e. [6], salt (i.e. [14], insolation (i.e. [11], and moisture availability (i.e. [12]), as well as Petra's new villain, humans [7]—all visibly active across Petra's dynamic weathering environment. Since sandstone is the primary building material across Petra, prior studies have explained that sandstone weathers in two ways: since sandstone is made of sand (clasts) in a binding matrix, either the clast fractures or dissolves to fall out, or the matrix fractures or dissolves to release the clast. These weathering types represent the processes of disaggregation that produce loose sand as the by-product of deterioration—the source of many of the sand dunes throughout the Near East and across Petra.

Deterioration studies, however, in other sensitive, arid areas are more common. In Egypt, it has been found that repeated drying and wetting cycles, or regular moisture spikes, in closed spaces (like tombs) have been linked to stone weathering. Decreases from nearly saturated states (95–100%) will increase architectural decay and stone weathering; however, in arid landscapes, it is the increase in humidity that is often the culprit. Emery [4] discussed the visible effects of fluctuating humidity on the interior chambers in the Pyramids of Giza. Other studies explained how moisture affected salt mobilization in wall frescos and warping in marble and marls. When the tomb of Queen Nefertari was unearthed in 1904, it was overrun with tourists until, by 1940, the chamber walls exhibited such extensive wall spalling from human-induced humidity that the tombs were closed. It was found that relative humidity increases from 30–70% were occurring and accelerating deterioration in

the Valley of Kings and Queens—solely due to the presence of 17–20 visitors in the tomb for 20–30 min each. This accelerated decay was attributed to respiration and perspiration and has been observed and recorded in Petra.

These findings in other arid regions in the Near East are markedly similar to our findings in Petra and form the thrust of this chapter. This study will use empirical data to address the effects of tourism on visitor-induced tomb interior humidities and architectural deterioration in Petra, Jordan. Observations of visitor touching, collecting, treading, and abrasion are prevalent across Petra; tourists and residents alike have become obvious perpetrators in the deterioration, abrasion, and attrition of architecture in Petra.

Petra's hewn structures, tombs, monuments, and constructed buildings all exhibit nature's expected influences on limestone and sandstone deterioration in an arid climate. However, what is notable is that tourism is accelerating the natural rate of surface recession, weathering feature development, and disaggregation (through touching, climbing, and abrasion)—a critical concern for sensitive and important cultural heritage sites like the ancient, magical city of Petra.

3.2 Tourism and Sandstone Weathering

In the 1990s, an extensive study was conducted on the Roman-style Theater of Petra—a hewn sandstone arena that seated up to 10,000 persons during Petra's heyday [9]. Although it was carved before full Roman occupation in 106 CE, it was hewn out of the sandstone cliffs according to the canon of the great Roman engineer, Vitruvius [17] (15BC). These recommendations of angles, curves, and dimensional ratios represented the highest Roman engineering and construction standards of the period and may be the reason for its lingering older name, “Roman Theater.” These early requirements for theater and building construction were so standardized that the level of the original surfaces can be estimated from the current recessed surfaces. Five hundred locations were examined across the Theater for intrinsic factors, like variations in rock composition and particle size, and extrinsic influences like sunlight angle, lichen coverage, slope, and surface temperature. This data set on sandstone weathering represents the largest such set in deterioration research.

The Theater study identified important weathering influences: sandstone composition (lithology), sunlight (insolation), climate (moisture regimes), and human contact. With stone composition, it was found that iron concentrations decreased recession of the architecture, while calcium concentrations were found to accelerate its deterioration. Weathering rates for the Petra sandstone were also identified—a rare and valuable tool in sandstone research. It was determined that vertical surfaces receded 2–4 cm since their construction (or 1–2 cm/1000 years), while on horizontal surfaces, stone generally receded 4–14 cm (or 2–7 cm/1000 years). Decreased recession on vertical faces is attributed to decreased standing water and saturation (and diminished wetting and drying cycles), while on horizontal surfaces, sunlight was determined to have a profound effect on accelerating deterioration through the heat-induced expansion of the clasts in the

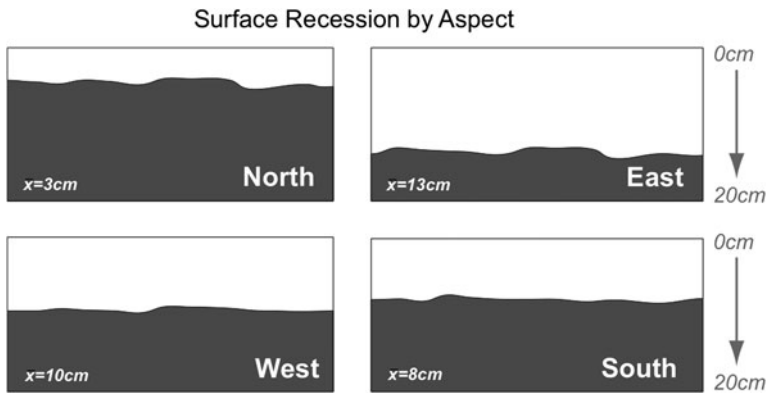


Fig. 3.1 Profile diagram of average surface recession in Petra, as influenced by aspect. The gray area represents the side view of the sandstone, depicting the recessed surfaces over 2,000 years of exposure. In Petra, eastern and western faces deteriorate the most (5–7 cm/1000 years) due to the tandem effects of moisture with sunlight—a previously underestimated and misunderstood influence on sandstone decay in arid regions like Petra, Jordan

sandstone and their subsequent disaggregation. In Petra, sandstone deteriorates fastest on eastern and western faces (5–7 cm/1000 years), as compared to 4 cm/1000 years on southern faces and less than 1–2 cm/1000 years on northern faces. Accelerated (naturally influenced) weathering in Petra has been attributed to factors of moisture and sunlight working in conjunction to disaggregate the rock. The lack of sunlight and heating and drying cycles on northern aspects has been attributed to decreased architectural decay [11] (Fig. 3.1).

Profile diagram of average surface recession in Petra, as influenced by aspect. The gray area represents the side view of the sandstone, depicting the recessed surfaces over 2,000 years of exposure. In Petra, eastern and western faces deteriorate the most (5–7 cm/1000 years) due to the tandem effects of moisture with sunlight—a previously underestimated and misunderstood influence on sandstone decay in arid regions like Petra, Jordan.

This study also established a previously unknown hierarchy of weathering processes responsible for sandstone decay. Statistics (primary component analysis or PCA) were used to explain the relative importance of the various influences breaking down the sandstone in Petra. It was found that rock composition was the most important single influence (25%), followed by the effects of iron concentration (17%) and climatic influences like sunlight and moisture (12%), in affecting the deterioration of Petra’s Theater. These findings emphasize the importance of lithology in understanding and predicting stone decay rates, especially in sensitive sites like Petra. Such a hierarchy is vital in grasping the comparative controls on architectural deterioration and the possible priorities needed in conservation applications and research in Petra (Table 3.1).

Statistical analysis (principal component analyses) divulged important relationships between sandstone deterioration factors and their hierarchies of influence.

Table 3.1 Statistical analysis (principal component analyses) divulged important relationships between sandstone deterioration factors and their hierarchies of influence

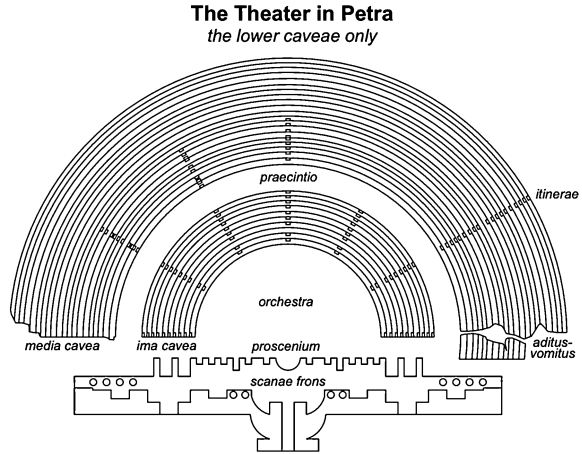
| | Sandstone composition (%) | Lichen overgrowth (%) | Sandstone density (%) | Sunlight (insolation, %) |
|---------------------|---------------------------|-----------------------|-----------------------|--------------------------|
| Horizontal surfaces | 24.5 | 19.7 | 16.7 | 12.4 |
| Vertical surfaces | 27.7 | 18.9 | 15.4 | 12.9 |

So, roughly 25% can be attributed to variations in sandstone constituencies alone (clast type, size, chemical variability, etc.), while 19% of all weathering in Petra can be attributed to lichen growth, 15–16% to rock density alone, and 12% singularly to sunlight. These factors cannot include the more complexly related (and difficult to measure) influences of tourism on decay. However, empirical baseline measurements such as these enable the isolation of human-induced deterioration and its rates

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Moreover, it was found that the deteriorating condition of the Roman Theater is also being accelerated by human contact, as tourism increases in the valley. When the theater was first examined for this research in 1990, at least 15–20% of it displayed original stonemason dressing marks, made roughly 2,000 years ago [11]. However, these marks are disappearing at a fast rate, especially on horizontal surfaces. In 2005, only 5–10% of the surfaces were found to exhibit stone dressing on the 2,000-year-old surfaces—an indication that sandstone weathering of the theater is accelerating. Since this change in the rate of decay cannot be attributed to intrinsic changes or a change in climate, it must be attributed to changes in visitor contact, such as increased foot-tread from climbing and jumping across the hewn theater seats, itineraries, and cavea. This accelerated surface recession is especially evident in the areas near the *orchestra*, *praecincterae*, and *itineriae*: the parts of the theater most commonly visited by tourists and tour group operators in Petra. As more visitors walk through Petra, however sensitive they may be in their interactions with monuments and landscape, relaxed government and cavalier tour operator policies, in addition to the newer, gripping hiking shoe soles, increase the traction between the visitors’ feet and the stone surfaces. Visitor-accelerated weathering in Petra will only decrease when visitation decreases, shoe soles afford less traction, and visitor access is restricted. A simple policy change would be effective in decreasing the ruination of the theater—access could be restricted to the *orchestra* and *praecincterae* (concentric walkways), since these areas can be entered and exited through the *vomitus* and *aditus* tunnelways. Minimal access or prohibited access may be used in the main theater, as the commonly observed practice of jumping between theater seat backs will drastically increase surface recession across the theater. This practice

Fig. 3.2 Planimetric diagram of the Theater of Petra. Built during the first century AD, the theater is believed to have accommodated as few as 3000–4000 up to 8000–12000 spectators. Research on the deterioration of Petra’s Sandstone Theater represents the largest data set of its kind in sandstone architectural and deterioration studies (in arid regions) on Earth



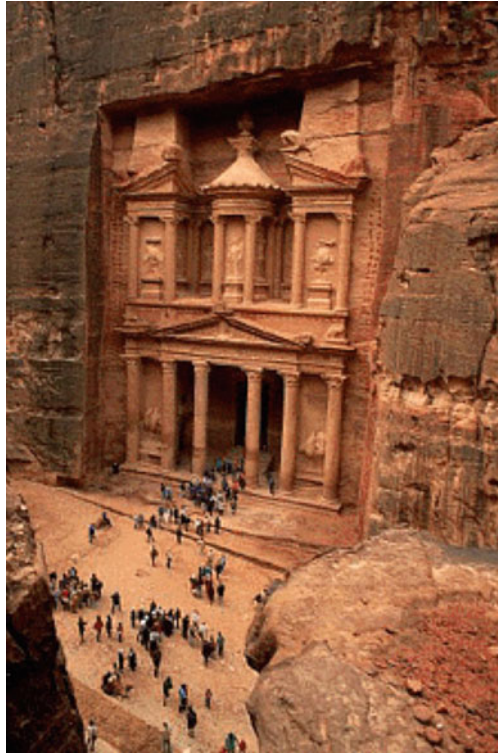
of jumping or climbing between seat backs as a quick way around the theater’s *summa cavea*, for great views of Petra and to witness the remarkable acoustical quality in the theater, is a typical practice recommended by tour group leaders. The visitor that enjoys the privilege of visiting this “age-old city, half as old as time,” may be in fact decreasing that same privilege for their descendents (Fig. 3.2).

Research on sandstone deterioration in arid regions has established important relationships between the deterioration of architecture and various influences, but all these affect the same process. Since sandstones comprise sand (clasts) in a rock binding material (matrix), sandstone breaks down by either (1) the clast falling from the rock or (2) the matrix releasing the clast. Research indicates that the various influences can include lichen overgrowth, case hardening, tafoni development, salt efflorescence, insolation, and moisture availability. It is humans, however, who may represent the greatest influence and the most rapidly detrimental one. As tourism dramatically increases at sensitive sites like Petra, it is becoming obvious that we represent the most destructive force affecting our cultural heritage sites.

3.3 Tourism and Erosion

Al-Khazneh, or, as it is commonly called, the “Treasury,” is Petra’s most-recognized tomb–temple, rising 40 m above the sediment-filled plaza that lies at the T-intersection of the Inner Siq and the Outer Siq. Its original purpose is unknown, but has been speculated to be a tomb, shrine, and/or worship site. This hewn structure was made famous in Spielberg’s 1989 film, *Indiana Jones and the Last Crusade*. It is elaborately faced with classical elements (i.e. pediment, columns, entablature), all carved directly out of a northeast-facing box canyon cliff wall. It consists of a primary chamber with three antechambers (with an interior volume of approximately 2,000 m³). As with most Nabataean architecture, the intricately hewn façade is aligned with interior antechambers and halls that exhibit little or no surface

Fig. 3.3 View from above Al-Khazneh or the Treasury. Taken in 2008, the image shows the large number of tourists who still visit Al-Khazneh approach and façade, despite the inner chambers being closed to entry (since 2002). On busy days in peak seasons (Spring and Fall), thousands of tourists will visit Petra in one day



decoration. Since 1998, environmental monitoring in the interior of Al-Khazneh indicates that there is a strong relationship between large numbers of visitors in the tomb and the increased recession of the chamber walls, in addition to a related increase in interior relative humidity (unrelated to outside climatic fluctuations). Since the tomb chambers in Petra were hewn directly from the local cliffs, many of these surfaces still display the original stonemason dressing marks carved into the chamber walls (and façades) 2,000 years ago. In fact, in most of the tombs and façades, remnants of these marks remain. In the Treasury, for example, the four interior walls all exhibit stone dressing tool marks. However, it is now obvious that these original dressing marks are rapidly deteriorating.

As tour groups enter the primary chamber of the Treasury, tour leaders typically have the visitors stand at or near the northwest wall, since the stone colors along the southwestern wall are spectacular and photogenic. Along this wall, visitors sit on the smaller chamber steps, lean against the wall, or sit bent-kneed along the wall base. While dressing marks are obvious across the ceiling and upper walls, they are notably absent on the lower walls. However, the northwest wall exhibits a distinctive recessed area or cavity. From 0.5 to 2.5 m above the floor, the chamber surface has drastically receded due to this increased and concentrated human contact (Fig. 3.3).

View from above Al-Khazneh or the Treasury. Taken in 2008, the image shows the large number of tourists that still visit Al-Khazneh approach and façade, despite

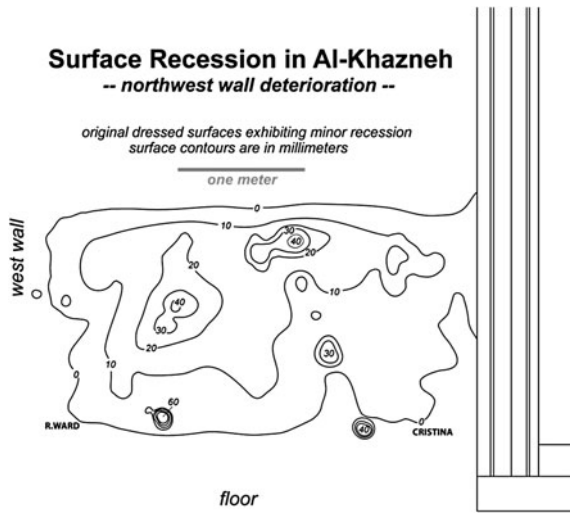


Fig. 3.4 Map representing the surface of the northwest wall of the inner chamber of Al-Khazneh. These cavities and areas of surface recession indicate where most tourist groups have leaned against the wall, causing substantial erosion from abrasion (feet, hand, head, derriere). The words “R. WARD” and “CRISTINA” are deeply gouged graffiti in the wall. The numbers represent surface recession (mm) measured from the originally dressed sandstone surfaces found along the same wall but below and above visitor abrasion. These dressing toolmarks were created 2,000 years ago by Nabataean stonemasons

the inner chambers being closed to entry (since 2002). On busy days in peak seasons (Spring and Fall), thousands of tourists will visit Petra in one day.

While Al-Khazneh was still open to the public (pre-2002), surface recession was mapped using laser leveling devices to ascertain the degree of surface recession. It was found that, across the 4 by 3 meter surface, more than one half meter of sandstone ($526,000 \text{ cm}^3$) had eroded from the inner chamber wall, mostly in that past decade (1980s to 2000s), from increased human contact. Since the area of recession was within 1–2 meters of the floor only, this suggests that it was indeed caused by direct contact like touching and leaning. On the more than 100 occasions that the Treasury was visited, it was filled with local Bedouins and Jordanian visitors, foreign tourist groups, tour guides, and numerous individuals leaning, touching, rubbing, and propping their backs against the chamber walls. It then comes as no surprise that the area of increased recession is a function of visitor contact during this century (and, moreover, during this decade). Even personally carved glyphs are evident in the Khazneh, where visitors have created petroglyphs marking their visit: ‘R. Ward’ and ‘CRISTINA’ are noticeably carved directly into the chamber’s northwest wall. This destructive practice is visible across Petra, where visitors have engraved their names (and, often, dates of visit) into the dressed and rough sandstone—a devastating practice and sad “custom” [8] (Figs. 3.4, Fig. 3.5, Fig. 3.6).

Possible solutions for the anthropogenic surface recession in the Treasury may be twofold, and prohibiting visitor entrance in 2012 was a fundamental first step.

Fig. 3.5 Prior to the closing of Al-Khazneh in 2002, visitors would sit and lean against the hewn sandstone chamber walls causing surface recession and/or exacerbating natural chamber deterioration and sandstone disaggregation processes

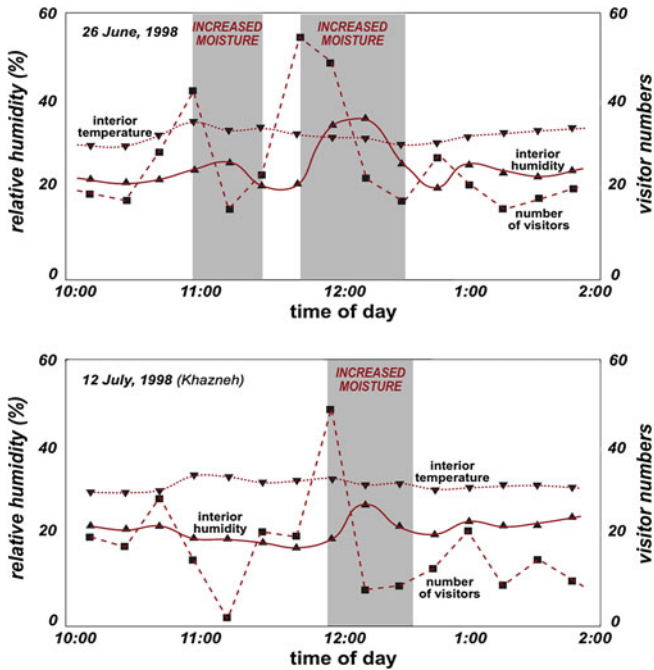
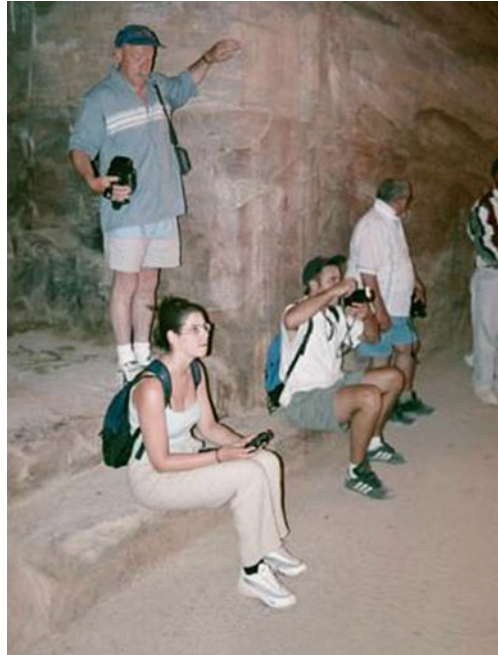


Fig. 3.6 Graphs representing the relationships between visitor numbers in Al-Khazneh and the changes in relative humidity. The gray areas highlight the large spikes in chamber humidities that occur as a function of in-tomb tourist respiration, perspiration, and transpiration

Another solution now conventionally implemented in other sensitive sites (i.e., Egypt, US Southwest) is to strictly monitor in-tomb behavior, prohibit access to walls (touching, leaning), create supported floor panels that proscribe walking directly on the sandstone chamber floors, and restrict in-tomb visitor numbers at any one time, with time spans between visitors long enough to permit the tomb chambers to restabilize to a naturally lower humidity. For the surface recession caused by direct contact, the obvious mitigative procedure was recently implemented: prohibiting visitors from entering the tomb chamber and/or simply restricting their touching or leaning against the sandstone surfaces. Simple cordons and barriers have a record of effectiveness. The policy to prohibit all tourist entry has been employed since 2001–2002 and—so far—the rate of surface recession appears to have decreased, as witnessed by the lesser quantities of sand dislodged by sandstone disaggregation collecting at the wall bases in the chamber.

3.4 Tourists and Chamber Humidity

Other than the notable work in Egypt's Valleys of the Kings and Queens [5], studies that address the direct effects of humans and small-space humidity changes in tomb chambers, like those found across Petra, are rare. So, Al-Khazneh represents an ideal laboratory for this much-needed research on the effects of humans on deterioration. Recent research at quarries above Petra has corroborated that moisture and temperature in tandem accelerate stone deterioration in arid regions like Jordan—a previously underestimated and misunderstood effect on the deterioration of architecture [8].

Along the western slopes of Petra's mountain barrier, Jebel Kubtha, lies the hewn row of the Royal Tombs, which include the Urn, Silk, Palace, and Corinthian tombs. The Urn Tomb was hewn and constructed high up on the cliff face and requires a number of stairs to enter; the original Nabataean access has been lost, but since its use as a Byzantine church in the fifth–sixth centuries, a series of vaulted flights was rebuilt to lead up to the façade. The structure consists of a large chamber with seven niches (six to the rear, one near the front) and an even larger outside plaza (25 × 15 m), with two flanking colonnades. Its interior chambers and main hall displace approximately 3,600 cubic meters of volume (or nearly double that of the Khazneh at 2,000 m³) (Fig. 3.7).

The Urn Tomb is second only to Al-Khazneh in tomb visitation in the Valley of Petra [13], so it is typically filled with tourist groups throughout the busiest months of April–May and September–November. Groups of 20–30 visitors often visit the tomb in series, with as many as 100–120 persons in the tomb at one time during peak seasons and peak times (10am–2 pm). Since the Urn Tomb interior displaces much larger volume than the al-Khazneh, it follows that more moisture is needed to change the interior humidity (specific and relative). Across Petra, interior humidities have been recorded sporadically in various tombs over the past decade (1998–2007), and it was found that, when visitors inside the Urn Tomb increased

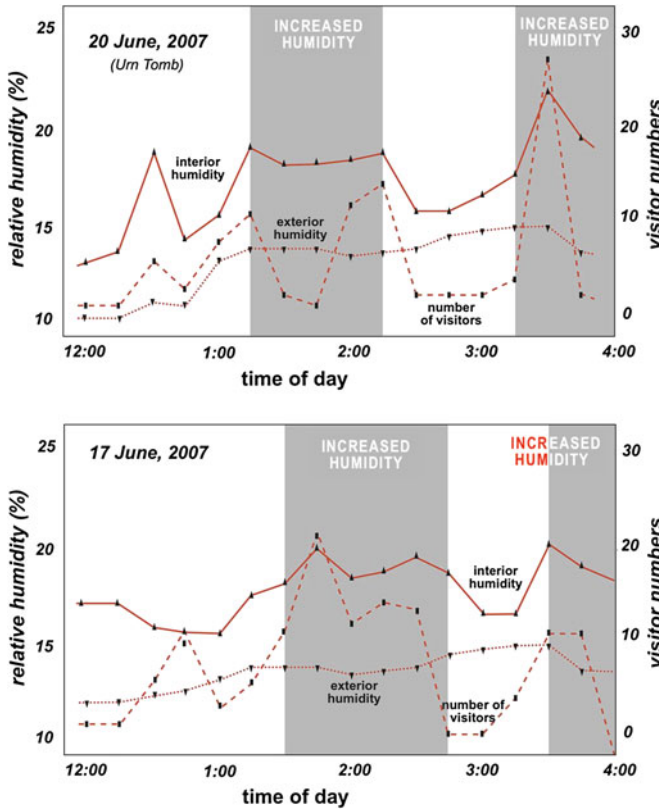


Fig. 3.7 Graphs representing the relationships between visitor numbers in the Urn Tomb and the changes in relative humidity. The gray areas highlight the dramatic increases in chamber humidities that occur as a function of in-tomb tourist respiration, perspiration, and transpiration

from 10 to 20, the relative humidity increased from 6–8% to 18–25%. In the Khazneh, an increase of visitors from 20 to 50 caused a jump in humidity from 20 to 40% (under similar external climatic conditions). Although the Urn Tomb displaces twice the volume of the Khazneh and is located in a setting more conducive to air mixing, readings recorded a faster humidity change in the Urn than in the Khazneh tomb. This may be attributed to a number of variables, including the two smaller portals in the Urn, compared to one large door in the Khazneh, and the increased air mixing that occurs with more people entering, moving about, and exiting in a smaller space, like that of the Khazneh. In general, the greatest increases in humidity occur when visitor groups of 20–30 tourists remain within the tomb chambers for more than 5–10 min. This is an important finding, since many tour groups visiting the primary tombs consist of at least 10–30 persons, who remain in the chamber for more than 5 min.

Moreover, it was found that visitors in the tombs contributed to chamber humidity within 15 min of their entry. Through statistical correlations of

determination (r^2), maximum increases were identified as occurring 10–20 min after entry. This lag time between when the visitor respired and when the humidity was recorded in the tomb had never been previously identified in arid-region tombs, and it is vital in understanding humidity changes induced by visitors. Striking increases (in r^2 values) increased from 0.136 to 0.895 and from 0.005 to 0.707 when the time was simply shifted by 15 min. Understanding this lagtime will facilitate the determination of visitation times in each tomb chamber across Petra and in other arid regions—a crucial concept and a first step in creating tourism carrying capacities.

Drier structures exhibit slower deterioration rates than wetter ones, so for humidity-induced deterioration, mitigation would include the modification of interior microclimates through the use of technology or policy. The installation of dehumidifiers and/or fans (controlled mixing) has proved successful in other sensitive sites (i.e., Rome, Egypt); however, technology simply addresses the “symptom,” not the cause. In other arid regions, successful policies have restricted the number of tourists entering the chambers, in addition to the period of time they are permitted to remain inside. Previous research in Petra is beginning to determine the relationships between visitors and humidity change [7], so once an understanding of carrying capacities is ascertained, solid and effective policies may be created and implemented, which would decrease the overall human-induced in-tomb humidities.

Prior studies have shown that increased moisture in restricted spaces increases the production of surface salts (efflorescence), increases in-rock permeability and moisture wicking, and causes a general accelerated deterioration of sandstone due to particle disaggregation, but precisely how this increased moisture regime contributes to accelerated deterioration in Petra, however, needs further study. The links between increased visitation and increased humidity are however indisputable. Because Petra’s visitors have increased from roughly 100,000 in 1990 to 800,000 in 2008, it is essential that we monitor all environmental variables (external and internal) in order to evaluate carrying capacities and accessibility in this sensitive UNESCO World Heritage site.

3.5 Implications and Suggestions

In 2009, nearly one million visitors entered the narrow Siq to walk the short mile into the Valley of Petra and visit the more than 800 carved tombs, temples, and structures. This is an increase of 40% over visitors in 2007, and, with its recent election as one of the new Wonders of the World (by 22 million votes), it is likely that Petra’s wonders will be seen by more and more visitors. While global tourism has increased to nearly one billion international arrivals each year [15], the second Palestinian intifada slowed Petra’s visitation in the early 2000s, though only briefly. However, the Jordanian government and regional Petra tourism council have developed plans to continually increase visitation across the Valley.

Therefore, in popular and susceptible tourist destinations like Petra, and across southern Jordan (i.e., Wadi Rum, Humeima), research that investigates natural and anthropogenic influences on architectural decay and environmental degradation is essential before it is too late, and irreversible changes have occurred in these vulnerable sites.

Humans can accelerate rock decay simply through touching, climbing, and treading; however, in this preliminary research it was found that even small tourist numbers can elevate moisture in tomb chambers, which may exacerbate stone weathering through a number of mechanisms, including the mobilization of matrix salts, ambient humidity variability, increased wetting and drying cycles, and thermal expansion and contraction. Prior research in Petra has exposed two dramatically important influences on deterioration: visitor contact (causing abrasion and consequent disaggregation) and human-induced humidity changes. These have been recognized, assessed, and mitigated in notable sites around the world, but left more or less unaffected or ill-controlled in Petra. It was found that, along the walls commonly used by tourists for leaning and squatting, continual abrasion was occurring between the leaning tourists and the hewn sandstone chamber walls. However seemingly minute, heaps of loose sand are found regularly at the bases of these retreating walls, confirming that, indeed, disaggregation through abrasion is ongoing. Although policies restricting such behavior have been implemented in Al-Khazneh, such conduct in other tombs and structures across Petra remains unchecked. Tourists engraving graffiti into walls, leaning against the façades, and climbing on Nabataean and Roman dressed surfaces are common in the Valley. Nowadays, the primary chamber of Al-Khazneh may be viewed from the doorway, with entry past the door threshold prohibited—an important trend in sandstone conservation practices in Petra. Nevertheless, without implemented and enforced policies, Petra's decay will continue. Findings regarding the friable and sensitive nature of Petra's Umm Ishrin and Disi sandstones suggest that policies regarding the restriction of direct visitor contact should be enforced in vulnerable environments like Petra.

In addition, and possibly more ubiquitous, is the visitor-induced humidity recorded in both tomb chambers in Petra—a known influence in sandstone deterioration. With as few as 10 tourists entering any chamber, relative humidity was found to spike to 10–20% in the said chamber—an amount found to accelerate rock disaggregation, with repeated cycles of drying and wetting, in arid regions.

This preliminary research of human-induced humidity in al-Khazneh and Urn tombs, along with an examination of the sandstone wall recession in Al-Khazneh, represents the beginning of new work that will bring new attention to the effect of tourism on the acceleration of stone recession and deterioration in Petra, Jordan, and similar sensitive and vulnerable settings. We are only now beginning to understand the complex and delicate nature of Petra's architectural deterioration and possible solutions that can help conserve and preserve it for years to come. Solid policy for Petra's sustainability lies in empirical and scientific findings. We now understand that architectural deterioration research and cultural heritage management practices must include an understanding of both intrinsic (i.e.,

lithology) and extrinsic (i.e., climate, human) influences. Not only do they assist in establishing rates of deterioration that help forecast surface conditions, features, and recession, but they can also help us better understand conservation methods, practices, and policies that can be used to decrease rates of deterioration.

Through nearly 20 years of field research in Petra's Theater, quarries, and primary tombs (Al-Khazneh, Urn), we are able to better understand the complex dynamics of sandstone weathering in Petra and in arid regions. The study of Petra's Theater and Khazneh enables us to comprehend the significance of rock chemistry, climate, and human behavior in interpreting deterioration mechanisms. Recording human-induced humidity fluctuations in tomb chambers brings new attention to the effect of increasing tourism on the potential acceleration of rock deterioration—a devastating combination for Petra's future.

As unchecked tourism grows in Petra, its unique architecture is deteriorating at rates faster than conservation efforts are decreasing this decay. Crumbling and broken pediments and receded walls, archways, and decorations are all visible in many tomb chambers and on most tomb façades. With regional and global tourism increasing, direct contact between visitors and these beautiful structures is also escalating. Increased tourism can accelerate sandstone weathering through direct abrasion (touching, climbing, treading) and disaggregation (elevated moisture levels). So, theoretical and applied studies that examine both intrinsic and extrinsic conditions to better understand weathering influences are essential for the preservation and conservation of Petra's unique architecture. From previous and ongoing research, we are slowly beginning to understand the complex and delicate nature of sandstone architectural deterioration in Petra and the possible solutions that can help keep it a truly magical place.

3.6 Conservation and Protections: Successes and Failures

Over the past 30–40 years, numerous attempts at sandstone and stone architectural conservation have been undertaken in Petra. Since archaeological conservation can involve both stone integrity and structural integrity, in Petra it includes the cleaning, reconstruction, renovation, mortar repointing, retrofitting of collapsed or weak structures, and/or actually mitigating stone at the material scale. Across the valley, structures have been or are being conserved through at the largest scale through reconstruction; these include the monumental buildings of Qasr al-Bint, Winged Lions, Petra Church, Blue Chapel, Al-Khazneh, Urn Tomb, and Great Temple. Structural fragments and broken portions have been re-mortared, rebuilt, reconstructed, and/or reused in efforts to recreate the original architecture. Also, conservation projects have included the rebuilding of original staircases to high places, revetments, and channel walls along Wadis Musa and Mataha, and the excavation and restoration of the original pavement in the Siq, all in tandem with the creation of new walls, stairs, bridges, and pathways through Petra.

However, innovative and contemporary conservation efforts now also include work at material scales (i.e., limestone column capital) in addition to structural scales (i.e., Great Temple). Material level conservation addresses extrinsic (i.e., climate, humans) and intrinsic (i.e., stone composition, integrity) influences on architectural deterioration, so the techniques used in their conservation must affect these factors directly. Conservation procedures can then (1) reduce material susceptibility to weathering and erosion forces, or (2) increase resistance to them. In Petra, extrinsic deterioration factors, such as human touching, climbing, and treading, may be diminished through enforced policies that either prohibit or require certain aspects of behavior; banning entrance into the primary chambers of the Treasury (Khazneh) has proved effective in decreasing both human-induced abrasion and humidity shifts caused by respiration, perspiration, and transpiration. Loose sand as a by-product of sandstone weathering through disaggregation is no longer evident in large quantities at the base of the chamber walls.

Also, entrance into Petra's Theater has been restricted, in the hopes of decreasing the abrasion recorded over the past 15 years as a result of increased numbers of tourists climbing the theater's carved benches and seat backs [8]. Carved to exacting Roman-style standards 2,000 years ago, the hewn sandstone theater has witnessed recent accelerated erosion from visitors' gripping soles ripping (disaggregating) the sandstone clasts from their rock matrix. Although it is difficult and problematic to monitor and assess the decrease in erosion and weathering from this new policy, if enforced, this wise policy can only halt or—at least—decrease human-induced deterioration across the theater. Conservation policies that prohibit climbing of façades, leaning and touching Nabataean-carved surfaces and decorations, and/or collecting architectural remnants or artifacts would seem obvious in the protection of Petra; however, they remain perfunctory and not codified or enforced there. Such restrictions may act not only to decrease overall stone weathering and erosion, but to also create a sense of patrimony and caring among the visitors in Petra. Understanding that all people are a part of Petra's protection and salvation may, in fact, instil a sense of legacy and heritage in all tourists to the Valley.

Although current research in stone conservation focuses on the use of consolidants in strengthening stone integrity and fabric, the removal of salt efflorescence, plants, and lichens (in most cases) alone can decrease the rate of erosion and weathering. These simple procedures have proven effective in the past. Conservation methods, however, may also address the influences of intrinsic weaknesses that facilitate rock weathering and erosion. Since Petra's architecture is primarily built of carved and dressed sandstone (and some limestone and limey-sandstone), liquids and waxes have been applied over the millennia, in the hopes that disaggregation can be controlled through the better adherence of the clast to the matrix. Vitruvius described the use of beeswax as a means of consolidating and waterproofing stone (15 B.C.), and similar applications have been tried since. In Petra, these organic applications were probably used during its classical heyday, in addition to inorganic washes such as calcium carbonate, plaster, and slurry. In fact, across Petra, such plaster applications (for consolidation and/or fresco overlay) are

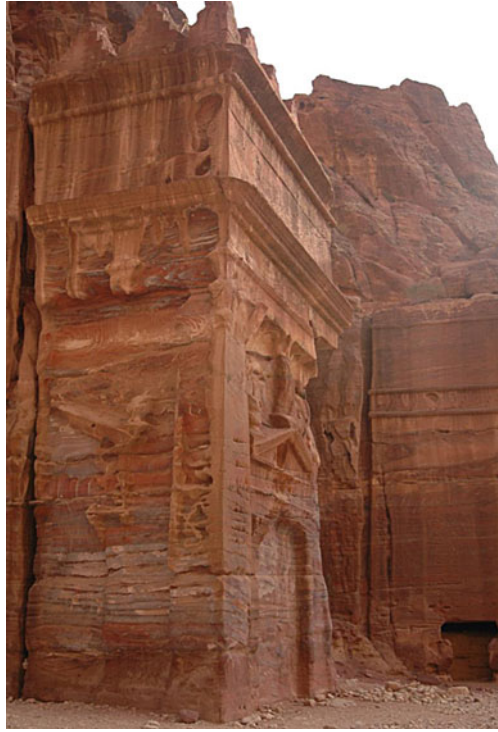
visibly preserved on chamber walls, façades, theater benches, couloirs, and staircases, where the carbonate coating has been protected from the destructive influences of sunlight, extreme temperature cycles, touching, precipitation, and woodfire sooting.

Contemporary sandstone consolidants are categorized as synthetic (or organic) polymers, silanes (alkoxy), epoxies, and waxes—all these having been used and/or tested in Petra on the Umm Ishrin and Disi sandstone architecture. The earliest experimental trials from the 1980s utilized polymer consolidants (i.e., Paraloid®), their application often visibly evident. Polymer test patches are still visible on talus boulders along the path between the Avenue of Façades and the High Place of Sacrifice at Jebel Madhbah, where blue enamel paint was used to outline a square (roughly a quarter meter square), within which the polymer consolidant was applied. Organic resins were also applied to bind cracks and fissures in the sandstone elements of the Qasr al-Bint. Since their applications 20–30 years ago, these consolidants are still visible, though now discolored, bleached, and peeling—a condition typical of acrylic sandstone consolidation over time. Similarly, comparable states of post-treatment deterioration have been found with the polymer consolidation of numerous Egyptian sandstone and limestone structures and reliefs in the 1908s [18].

Extensive silane applications were also tested in the 1990s by teams from the Jordanian Department of Antiquities, GTZ (now GIZ, Deutsche Gesellschaft für Internationale Zusammenarbeit), Hashemite University of Jordan, the American Center of Oriental Research (ACOR), and Aachen University (Germany). Silanes (e.g., Wacker OH®) are organosilicon compounds that permeate the voids in the sandstone to strengthen its mineral fabric and decrease its overall permeability (and active porosity) by creating a silica gel that fills the voids, binds the clasts, and “waterproofs” the stone. These have been applied across Petra, including at Djinn Block #9, Tombs #825 and #826 (the Tombs of the Graves), and various architectural remnants, decorations, and installations, including column drums, capitals, cornices, façades, and glyphs. Silane applications have proven to be effective consolidating agents when the whole object may be immersed, so that the solutions may penetrate all portions of the sandstone in question (e.g., on a statue). However, when applied to sandstone *in situ*, like the façade of a tomb, variability in penetration depths and coverage permits moisture to become trapped or enter and mobilize behind the silica skins. Once this occurs, rather than the normal disaggregation of the clast from the rock, spalling and sheet collapse can occur. However, in Petra, more time is needed to observe and assess the potential problems with silane applications. The results of its use in sandstone conservation across Petra will either represent an exemplary warning against future use or an excellent model for continued applications in Petra and on sandstone architecture elsewhere (Fig. 3.8).

Moreover, in the 1990s, the German Government and the Jordanian Department of Antiquities, through the work of GTZ (German Technical Cooperation Agency,

Fig. 3.8 This unfinished tomb façade is located between the Al-Khazneh (Treasury) and the Avenue of Façades, situated across from Tombs #828, #826. The original Nabataean dressing has been long since eliminated by the natural processes of water and moisture-induced weathering and erosion. Moisture is an archetypal weathering and erosion influence across Petra, less through its surface abrasive force, but more pervasively through the ubiquitous cycles of wetting and drying, or more rarely freezing and thawing



now GIZ), created the Conservation & Restoration Center in Petra (CARCIP). It was established to create a stone conservation and restoration center in Petra, to be ultimately operated exclusively by Jordanian specialists and staff, including many of the local B'doul Bedouins. Early support by GTZ/GIZ was strong and innovative, and practical projects were conducted across Petra; however, recent funding issues have slowed its operation to the point that new funding is required for its continuation in Petra (Fig. 3.9).

To date in Petra, although the innovative applications of surface consolidants continue to be effectively tested and utilized, the most successful conservation procedures and projects have been at larger scales across the Valley. The successful, important, and popular reconstructions of the Great Temple and Petra Church (and its eminent mosaics) have intrigued a new generation of visitors to the Valley, while adding a much needed piece to Petra's missing history. At a more ubiquitous level, however, are the subtle conservation efforts that involve continual conservation practices and touristic policies based on the findings of in-depth empirical investigations. These have included (1) the removal of plant and lichen growth from channels, façades, and tomb interiors; (2) new and enforced policies that restrict tourists from entering sensitive sites like the Khazneh and Theater; and (3) the provision of signage, maps, and

Fig. 3.9 Façade conservation and consolidation project on Tomb #825 by GTZ/GIZ with the Jordanian Department of Antiquities in the 1990s. Conservation included assessment, façade surface condition mapping (i.e. features of spalling, recession, tafoni, disaggregation, cracking), plant and lichen removal, sandstone petrological testing, and the applications of silanes for increased sandstone integrity



brochures that educate the visitor about architectural and environmental protection—all in the hopes of creating a sense of personal stewardship of the cultural, physical, historic, and ethical worlds of archaeological and architectural protection and conservation.

Photographs and Captions by T. R. Paradise, 1992–2007

Damage is evident on the original Nabataean-dressed surfaces of the Quarry at Anjar (above Wadi Turkmaniya, below Umm Sayhoun). Drillholes varying in diameter from 5–50 mm were made in the late 1990s by GTZ/GIZ, for the removal of stone cores to be used in sandstone consolidation testing. Additional scoring and glyphs were made with no explanation made at the time. The largest drillhole in the photograph is 40 mm. At this height above Petra, this whitish sandstone represents the Disi Formation, which sit atop the renowned red-mustard colored sandstone of the Umm Ishrin Formation which give Petra its famous title as the ... 'the Rose-red City, half as old as time'.



Exhausted tourists sit in Petra's Theater, atop the original Nabataean-dressed seatbacks and benches, seen here sitting, standing and climbing about the Theater's lower portion (*ima cavea*) at the orchestra. The theater's original stone dressing has been disappearing at a rapid rate from increasing visitation, and the dressing at the bottom near the tourist entrances (*vomitus*, *aditus*) is vanishing faster than any other section of the Theater. Notice the rounded edges to the benches and steps (*itineræ*), in addition to the presence of sand from the disintegrating sandstone across this part of the Theater. Since the early 2000s, entrance into the Theater has been restricted, but is still permitted for concerts, talks, and various events despite efforts to prohibit entrance altogether by various agencies and NGOs.



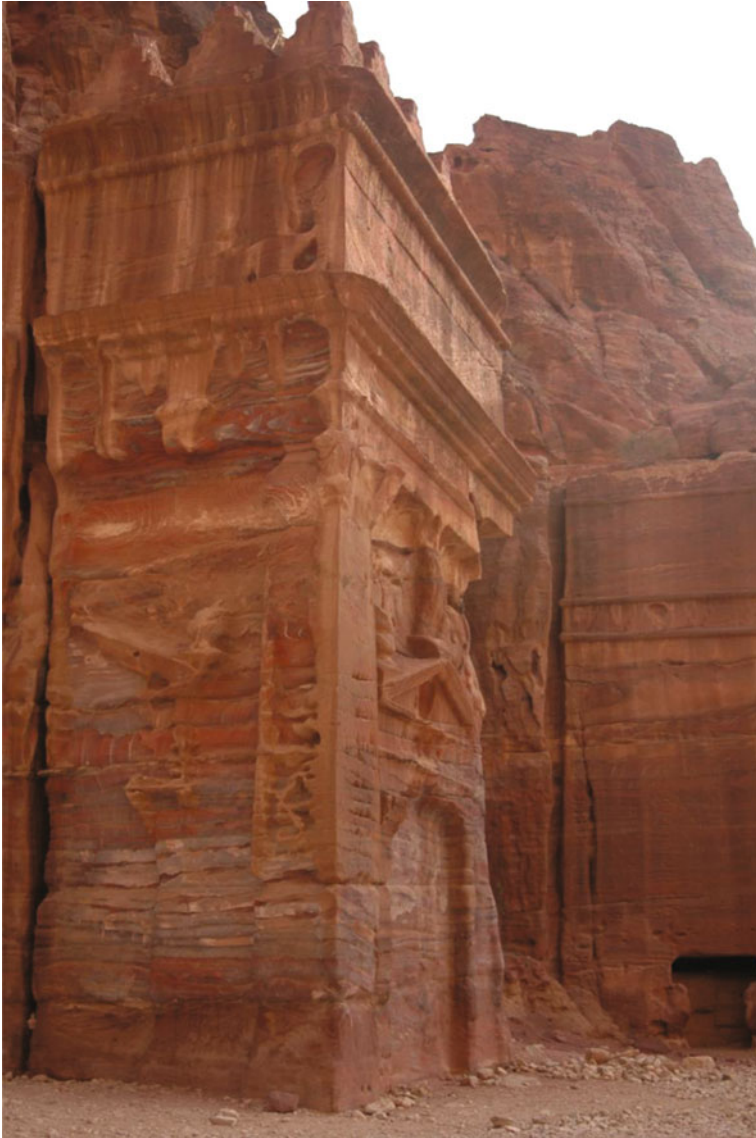
During the warmer months, when grazing grasses are abundant, local Bedouin families may be found living in the Quarries at Anjar above the Valley of Petra. These walls, steps, couloirs, tombs, and plaza-like areas exhibit distinctive Nabataean dressing marks (2,000 years old), and are deteriorating at dramatically rapid rates from climbing, woodfires, goating and grazing activities, and tent installations across the quarry floors.



The Palace Tomb is one of the most accessible (and visited) of the Royal Tombs, with simple entry by walking around, or climbing up the hewn sandstone podium in front. The highlighted area shows the zone of rapid deterioration from (a) visitor-induced abrasion and contact, in addition to (b) moisture wicking and salt efflorescence—a widespread natural sandstone weathering agent in arid regions. As the moisture dries in the sandstone, the residual salts within the rock matrix, and adjacent soil and rock, pry apart and disaggregate the sandstone as they change from liquid form into salts crystals.



Queues of tourists can be seen early in the morning, when the first buses arrive and the sun is relatively low. They can be observed climbing the steps, staircases and couloirs up to Jebel Madhbah and the High Place of Sacrifice, and to the Monastery or ad-Deir. These broad staircases leading into the couloirs (photograph center) are dressed with original Nabataean stonemasons marks indicating an origin 2,000 years old.



This unfinished tomb façade is located between the al-Khazneh (Treasury) and the Avenue of Façades, situated across from Tombs #828, #826. The original Nabataean dressing has been long-since eliminated by the natural processes of water and moisture-induced weathering and erosion. Moisture is an archetypal weathering and erosion influence across Petra, less through its surface abrasive force, but more pervasively through the ubiquitous cycles of wetting and drying, or more rarely freezing and thawing.



Nabataean dressing marks were created by stonemasons 2,000 years ago to smooth irregular sandstone surfaces for in-situ architectural production (al-Khazneh), or to form blocks that would be utilized in stone block and mortar construction (Qasr al-Bint). Roman dressing has a regularly-spaced point-and-dimple appearance, while the Nabataean dressing is distinctively herringbone in appearance.

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Author Biography

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Chapter 4

The B'doul and Umm Sayhoun: *Culture, Geography, and Tourism*

Christopher C. Angel

Generally excluded from the formal development of tourism at Petra, many B'doul pursued informal avenues of deriving an income from the tourist trade. These included selling real and fake antiquities to tourists, providing animal transport into the site, and serving as guides...Kenneth Russell (1993)

Since the 1920s, the B'doul Bedouin of Petra have understood the economic importance of tourism. Coupled with agriculture and goat-herding, the B'doul were able to utilize tourism as a means of maintaining a semi-nomadic existence within the valley of Petra. They have been living among the tombs and caves for over 170 years and after the influence of tourism, were able to adapt a more "settled" lifestyle. As travel agencies and large scale accommodations developed within the valley and around the area, the B'doul were increasingly excluded from the larger decision-making processes taking place concerning the archaeological site.

Within the past 20 years, due to political circumstances, this local Bedouin tribe has been forced to abandon their semi-nomadic lifestyles in favor of permanent settlement, resulting in the evolution of a small hamlet into a thriving town of nearly 3,000 people filled with shops, garages, playgrounds, a *masjid*, and an elementary school (*madrassa*), located on a plateau visible above the popular tourist destination of Petra, Jordan. Discussions of a possible new location for the B'doul were taking place as early as 1968 [7]. However due to UNESCO recommendations for their relocation outside of the new World Heritage site, design and construction of the concrete block houses in Umm Sayhoun began around 1980 and the B'doul began relocating in 1984. In the village of Umm Sayhoun, the B'doul tribe transformation was a swift one, with the immediate creation of a school, piped water, electricity, and simple health-care services as a part of the relocation plans. Life within a "conventional" urban infrastructure including utilities, permanent gardens and pens, subfloor plumbing, and glass windows, for example, was a new indulgence, as well as a new lifestyle for the B'doul [1].

After their relocation from Petra, the Bedouins slowly reduced their cyclic movement from pasture to pasture, following water sources (cisterns, wadis), and seasonal resources (grazing grasses and settings, winter and summer wheat). Their life then was focused on revenue and food from goat-herding and vegetable (i.e., tomato, zucchini, cucumber) and fruit (i.e., apricot, pomegranate, apple) cultivation. This sudden shift from a semi-nomadic to sedentary lifestyle was relatively unexpected for the tribe and, prior to removal, was seen as something “far away and insubstantial” [6, p 114]. Now the B'doul are faced with challenges of unsustainable tourism, rapid village growth, changes in identities, and regulations from local and national authorities. This chapter will discuss the events leading to relocation, examine the historical development and construction of their buildings and community complexes (i.e., masjid, madrasa), and assess the current state of the B'doul and their village.

4.1 Bedouin Life in Jordan

There has been strong encouragement by the Jordanian government to settle the Bedouins in Petra and across the kingdom. Over the past four decades, throughout the Middle East and North Africa, conscious attempts have been made by governments to integrate nomadic and semi-nomadic Bedouin, Berber, and Tuareg populations into the emerging, and historic sedentary communities across the region [3–5]. In most cases, states played the decisive role in the location and organization of the settlements. These relocations have had both positive and negative effects on the Bedouins, but effects have also been felt among across the country within the non-Bedouin communities of the region. Even though settling the Bedouin is seen as both positive and desirable, many of the non-Bedouin communities and societies view pastoralism and the Bedouins lifestyle negatively—even though the Bedouin lifestyle is continually romanticized in Arab television “soap operas”, theme restaurants across Jordan and the region, and in Western and Arab novels and pulp fiction.

One of the main reasons for the consistent Bedouin marginalization lies in their contribution to the national economy, vision, and national essence. Administratively, if the Bedouins are settled they can be counted, and contribute to other aspects of the nation and national identity including the census, taxation, and in national plans for development. Unfortunately, the reasons are numerous as to why the Bedouin villages and settlements are not taking shape in a way that facilitates and maintains the “traditional” Bedouin lifestyle. These influences include the difficulties attached to nomadic routines in urban settings, the imprint of “nation” and not “clan” that can be unintentionally connected to a government planned and maintained settlements [5], and the complex concept of a democratic system imposed on a clan-based hierarchy where elders are valued over the young. Many aspects of Bedouin culture simply cannot be integrated in urban settings of the past, or the present. The complications facing and developing in Umm Sayhoun

may represent the same issues and problems facing Bedouins as they integrate into larger sedentary communities across the Middle East and North Africa.

4.2 B'doul Bedouin in Petra (pre 1980s)

The B'doul tribe is currently the main Bedouin group living in or near Petra with a population of nearly 3,000. Traditionally, in Jordan, Bedouins have been nomadic and lived through means of pastoralist agriculture. Prior to 1984, research has shown that the B'doul lived in the valley of Petra for at least the past 150 years [2, 8]. Throughout B'doul history, from what little is known, subsistence was primarily based on the herding of goats, supplemented by the seasonal cultivation of small plots of barley, tobacco and wheat, and the hunting and gathering of available plant and animal resources (Russell 1993). Other Bedouin tribes exist both north and south of Petra, consisting of the Amarin and Liyatnah tribes. These other tribes are similar to the B'doul in that they too supported themselves by herding goats and subsistence agriculture.¹

Traditionally, the local Bedouins lived in either nomadic tents or resided seasonally in the caves throughout the region [2]. However the B'doul Bedouin, through much of their known history, have been considered semi-nomadic since they would seek higher ground during the summer months to herd goats and cultivate the land while occasionally settling in parts of the valley. While settling in the caves and tombs, the B'doul constructed makeshift walls, doors, and windows while still setting up tents outside in the open areas. Much of the terrain of Petra is not conducive to farming and agriculture, so movement was still a necessary aspect of daily life [2]. Their "traditional" dwellings in the caves and tombs of Petra allowed for a mobility not seen in other Bedouin tribes of the region, Levant or North Africa. Cultivation of the land and the raising and herding of goats and camels still contributed to most of their subsistence living. Living within the confines of the valley of Petra gave them a touristic edge over other Bedouin tribes in the area.

In the 1920s, Thomas Cook & Sons established a tourist camp in the main valley of Petra. Members of the B'doul and other tribes were employed as help and guides. Eventually the camp was converted into a hostel housing tourists and research teams by 1937 (Russell 1993), locally called and advertised as "Nazzal's Camp". While most B'doul families at the time remained pastoralists and goat herders, more and more members participated, and were hired in touristic activities, and at archaeological excavations. As tourism became an increasingly large component of B'doul lifestyle, shops were set up by members of the tribe in the main valley, at the end of the Siq near the Khazneh, and at other tourist concentrations [9]. Bedouins began to sell artifacts—both real and fake—and rides on camels, donkeys, or horses. They filled other roles within the valley, and surrounds as well. Some served as tourist guides and tourism police, or owners of stalls for

selling refreshments, or even reenacting Bedouin tribal dances and rituals for tourists.

After Petra attracted international attention as a result of tourism, the Valley was nominated for and became a UNESCO (United Nations Educational Scientific and Cultural Organization) World Heritage site in 1985. As early as 1968, the Jordanian Government with the help of USAID [10] developed a plan to “resettle” the B'doul of Petra into permanent units outside of Petra. This was part of the Jordanian Government's re-organization of Petra along more commercial lines in an attempt to improve facilities for tourists [2].² Therefore in 1985, the new village of Umm Sayhoun was constructed. The B'doul were forced to move into the new units over the next few years. By removing the B'doul from Petra, Russell (1993) pointed out that “many of those old enough to still remember the distant past through their childhoods or the stories told by their fathers and grandfathers will soon pass away” and how the removal “brought a final end to traditional B'doul lifeways for most families.” Ken Russell's observations in the 1990s are still evident today where B'doul elders are still seen goat-herding in the village, using herbal medicines, practicing traditional cooking (mensafs), and playing age-old games like “dhab”.

4.3 The B'doul and Their New Village (1980–1990s)

The new settlement of Umm Sayhoun is located west of Wadi Musa and northwest of Petra. The village itself is still within the official boundaries of the National Park, is situated on a narrow limestone plateau directly above the Nabataean quarries at Anjar, and is visible from the main valley below. As of 2,000, the population was estimated at about 1,300, and is currently between 2,000 and 3,000 residents in 2010. In its original plan, in 1984, the village consisted of 120 houses [2] but the village itself has increased dramatically in its physical extent since its creation nearly 30 years ago. The original city plan and layout has been modified and expanded in all directions (Fig. 4.1). As tourism has increased since the World Heritage declaration, the growth of Umm Sayhoun also has been rapid, especially in recent years. The rise in tourism has contributed to sharp rises in income for the B'doul and Umm Sayhoun as well. What began as simply a village of unpaved roads, simple one-story concrete brick structures (Fig. 4.2), and few vehicles, now is filled with paved roads, streets, and parking areas lined with cars, trucks, and occasional tour buses, ice cream and food stores, services, artisanal shops, auto shops, a pool hall, and even a travel agency. These streets provide quick and easy access to Petra National Park, Beidha, and Wadi Musa although public access into Petra from the village is restricted. Also, in the past 20 years, we have seen increases in structure size, changes in structural function, planned and unplanned growth of the village as a whole, discrepancies in living standards, abandonment of traditional resources, and a new generation raised solely under the influence of tourism. In comparison to the surrounding communities, the B'doul Bedouin of

Fig. 4.1 Composite map representing the evolution of the urban morphology of Umm Sayhoun from its early days (1980s) until the present (2008), highlighting pivotal periods in the town's historical growth. The most dramatic growth occurred between 1998 and 2002 [1]

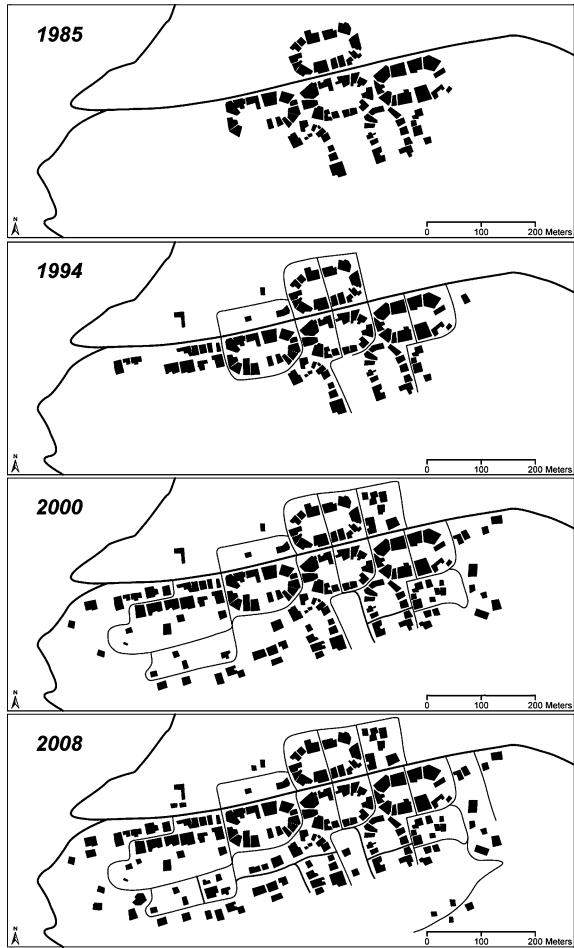


Fig. 4.2 An original one-story, simple cement block house built in the 1980s (photograph by T. R. Paradise, 2007)



Umm Sayhoun can be considered the most affected by the sharp rises in tourism and may prove Ken Russell's statement that a "final end to traditional... lifeways" to be correct, and observable.

Since their relocation, the B'doul have developed a new perspective on the region, the world, and themselves. Their removal to Umm Sayhoun has sparked a national recognition of this specific Bedouin group. Lane and Bousquet [7] conducted an investigation into the management of the park as a whole and reported on the influence of tourism on surrounding communities including the village. Their findings suggest that the B'doul were primarily concerned with "the need for social and national recognition" [7] and how Umm Sayhoun was fulfilling that exact role. Contrary to other settlement projects throughout the Middle East (Bedouin) and North Africa (Berber, Tuareg), these Bedouins have been given a specific village and zone where only they may reside. In other areas of Jordan, settlement is more likely to involve integration within an established location, usually in another village or city. Since their relocation to this new village of Umm Sayhoun, the B'doul have used their centralized position to an advantage, especially with regard to tourism. This new "identity" of the B'doul Bedouin is consistently reaffirmed and/or "fossilized" in the area of tourism. One author describes this shift in self-perception in that:

...a sense of Bedouin identity still remains, an identity that is constantly shifting and being re-defined...'Bedouin' is still the social category with which the B'doul are associated and in the presence of tourists, it is this identity which most often comes to the fore-front...They still see themselves of 'more Bedouin' than the others involved in Petra's tourist industry... [and this] industry helps to maintain and reinforce this identity for them. Wooten [12]

In the past, income and resources mainly focused on farming, goat-herding, and subsistence, with gradual attention being paid to tourism. Currently, much of the solidification of the new B'doul lifestyles has contributed to tourism being the main cultural focus of the tribal members. With this change the B'doul are now able to "sell" their identity to tourists. This can be seen as the Bedouins are inventing new "traditional" art, including sand-bottles filled with colored sand and different types of jewelry, as well as artifacts both real and fake (Cole 2003). It is also important to note that the B'doul hide their new ways of life from tourists, especially ways like "televisions and other modern conveniences, [they] are literate and increasingly have university-level education, and are becoming like *Europe people*" (Wooten 1996). Other economic ramifications of this shift are still to be seen. In the end it can be easily determined that relocation has changed the way the B'doul view themselves in relation to the changing world around them; a new sense of what it means to be a B'doul Bedouin has developed in the village. Tourism played a major factor in the removal of the B'doul from Petra and plays a factor still as their main connection to their traditional cultural heritage while living in Umm Sayhoun. Beginning in the 1920s, the Bedouins have had to learn how to adapt to this new source of income and industry, and have since been capitalizing on it—the Bedouins used to encounter tourism, now it encounters them.

4.4 The Village of Umm Sayhoun

The village of Umm Sayhoun was originally equipped with running water, electricity, and sewer capabilities. Upon which, these have been greatly expanded and improved. According to the Water Authority in Jordan [11], Wadi Musa and Umm Sayhoun maintain the most reliable running water infrastructure in the area. A majority of the roads and pathways in Umm Sayhoun are now paved and the main road running through Umm Sayhoun can be described as the main arterial flow of traffic and income (Fig. 4.3). At the far downhill end of the main road, the B'doul are afforded quick and easy access into the main valley of Petra where they receive most, if not all, of their income. Then income is transferred to shops or restaurants within Umm Sayhoun, or the main road is used again for travel to Wadi Musa contributing to the local economies there [1].

The growth of Umm Sayhoun can be easily evaluated by investigating the pivotal points in its history. In 1985, around 120 houses were completed to accommodate about 100 families (Bienkoswki 1985). Using national and regional planning assistance in tandem with input by B'doul elders, the original plan (Fig. 4.6) was drawn and implemented creating a series of oval blocks of houses which encircled open areas for parking, playing, gardens, storage and easy access to other houses within each section. These oval city blocks appear to be a unique, and practical element in the Levant [1]. Each structure had a single residential purpose to house one or two B'doul families (Fig. 4.1: 1985). At this time, the roads were unpaved and travel to Petra, Wadi Musa, and Beidha was arduous and difficult by vehicle.³ The majority of movement in and out of the village was to and from the valley of Petra. The village itself was laid out in a series of oval block arrangements to accommodate the B'doul in their loss of open areas as well as to facilitate the privacy of the major B'doul families. By 1994, just prior to the first reinvestigation of management plan of Petra, the structures and the village itself grew at an alarming rate (Fig. 4.1: 1994). New structures were built to include a school, a mosque, and a clinic. Also, the main road was paved contributing to village growth along the southeastern portions of Umm Sayhoun. These structures remained within close proximity to the main road (Fig. 4.4).

By 2000, the largest new structures were being built in the more remote areas of the southeast affording better views overlooking Petra (Fig. 4.1: 2000). The village continued to grow at a rapid pace to accommodate the growing populations, as it had increased to over 1,300. Also, by this time the village received improvements to infrastructure with the addition of a sewer treatment plant to the southwest (Fig. 4.4). Finally, a police station was placed at the "entrance" into Petra at the end of the main road. This was meant to limit the movement of tourists through Umm Sayhoun. By 2008, a majority of the open areas around the outer edges of the plateau filled in with structures of all kinds. Some of the original structures were converted into shops, markets, travel agencies, and other service-based storefronts, or open garages. Many of the smaller structures that existed within Umm Sayhoun were developed to provide corralling of livestock and locations for storage of vehicles or various supplies [1].



Fig. 4.3 A view looking up the Main Street in Umm Sayhoun. Only paved in the mid 1990s, the road represents the main artery for commerce, transportation, and utilities (water, electricity) to Umm Sayhoun and Beidha (photograph by T. R. Paradise)

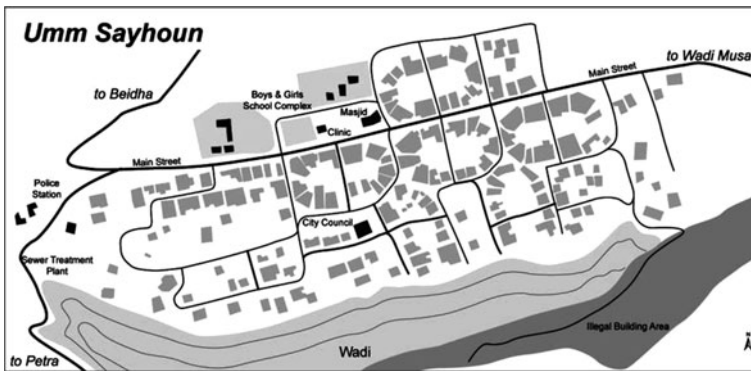


Fig. 4.4 Reference map representing the location of the physical terrain, morphology, and urban features of the village-town of Umm Sayhoun in 2008 [1]

The original village was relatively limited in space, yet growth was inevitable (Fig. 4.1: 2008). Currently, there is a new built-up zone developing at the town's southern fringe. Most of this area growth is shifting towards the cliffs facing Petra (southwest of Umm Sayhoun)—this may be Umm Sayhoun's first "suburb" or newest neighborhood (Fig. 4.4). The majority of the houses in this zone exhibit larger footprints, more stories, and of an overall higher quality. These new residences are owned by the wealthier B'doul and the increasing size of the structures are a testament to that. On this side of the village (to the southwest), there is a deep cliff edge (50–100 m) that affords those parts of the village-town a spectacular view of Petra. This is important because new luxury houses are being built in this area to utilize this scenic view in the hopes that one day, touristic lodging may develop in Umm Sayhoun.

Fig. 4.5 Three and four-story structures such as this one represent the emerging architectural style in the new neighborhood of Umm Sayhoun. Most of these large homes are located to the south and southwest of the main arterial road (photograph by T. R. Paradise, 2007)



In 1984, the average size of a single unit was 150 m^2 , and each has grown to an average of 255 m^2 with the largest structure at 725 m^2 [1]. The residential buildings were seen as too small for practical use, especially in comparison to the spaciousness of the caves in Petra (Fig. 4.2). As a result, the buildings that were once constructed with a single level are now being remodeled or renovated to two or three levels. These housing modifications are possibly a result of the perceptions that the B'doul developed while living in Petra [7] While living in the caves of Petra, the B'doul were accommodated to the differentiation in cave use, mainly that there were caves meant for work areas, caves for residential areas, open and public common areas for recreational and social gatherings, gardening locations, and other areas set aside for tents during summer months [2]. Therefore, it should be expected that the B'doul would rebuild, renovate or retrofit the newly acquired structures and open areas in similar ways that would reflect this differentiation. Some of the modifications and extensions have been horizontal, tearing down government placed walls and extending their territory to build more rooms and vertical, building new floors and creating a multi-dimensional living space (Fig. 4.5). As was the case in Petra prior to relocation, buildings are now being used for other purposes, beyond that of residential use [1]. These modifications have contributed to modern urban development in the area with the new creation of work places, public facilities, and paved streets. It was reported in 1994 that the modifications and changes within the village were at “the Bedouins own expense” [7]. Therefore, these increases are proportional to the changes in income as a function of the increases in tourism.

West of the main road, a mosque and madrasa can be seen which provides the Bedouins access to educational opportunities, religious classes, and daily and Friday worship without having to travel outside of the village (Fig. 4.4). This new centralization of education and religion has also changed the mobility of the B'doul and their identification with Islam.

Also, new structures have been built entirely to their own specifications, designs and needs. These structures are usually built by the wealthy residents complete

with balconies, multiple gardens, gated walls for privacy, and obvious attempts to acquire the best views of the valley. Other new structures are now appearing in an “illegal” area to the east of Umm Sayhoun, separated by a large ravine and wadi. Currently no infrastructure has been setup up to support this peripheral growth. Some B'doul are petitioning local authorities to prohibit growth here or to permit it. It will be interesting to see how this new area develops and whether or not the government will continue to allow this expansion. What is important to note with this area is that it is a clear indication of the need for more expansion to accommodate the growing village.

Since economic transitions were inevitable after the relocation to Umm Sayhoun, work places are set apart from living spaces; these included tent shops in Petra or local shops within Umm Sayhoun. Considering the previously discussed appeal of the identity of the Bedouins to tourists, the B'doul have set up tents and shops within Umm Sayhoun to cater to that demand. There are also small shops along the main streets in Umm Sayhoun with some specializing in tourist items and services while others provide local needs such as groceries and personal items.

As of 2007–2008, a number of new trends were obvious. The newest structures included a pool hall, rentable lodging (however questionable in legality), new shops, cafes and small restaurants (for years there was only one), and three travel agencies. Also, the B'doul are now utilizing technologies that were unavailable in the past such as computers, high-speed wireless internet for email, Twitter and Facebook, automatic garage doors, and high-end luxury vehicles. The new roads that run through major parts of the village contribute to the growing number of automobiles in the area, especially in the nodes and areas of primary use. Bedouins are often seen driving their trucks or cars into the back entrance of Petra on their way to work. Work in Petra involves retail shops (souvenirs, books, snacks, jewelry), services (town guides, tours, and medical assistance), food, and recreation (hiking guides, camel treks), and out-of-town “Bedouin Experiences”: large tented complexes for dining, dancing, and overnight stays. Many shops in the village are for Bedouin use, but many have also been setup to provide assistance, products, and services to tourists that now visit the village. This is also why there are now a few lodging facilities available in the village that increasingly serve tourists, archaeologists, and visiting scholars, especially once regional lodging policies and licensing are standardized [1].

Above the police-manned, gated road into Petra, at the end of the main road is the main road to Beidha, a small Neolithic site and the home to Little Petra, a burgeoning touristic destination. Many Bedouins maintain relationships with other B'doul as well as other tribes that live there. Because of this easy access to Beidha, many that own shops or work in Petra may now live somewhat distant of their main sources of income. However, considering that travel to and from Beidha requires automobile transportation, it is usually the wealthier Bedouins who travel to and from Petra on a daily basis from Beidha (or hitch a ride). As Beidha develops into a satellite community for Umm Sayhoun, businesses have also grown in Beidha where busloads of tourists may experience “local Bedouin culture” by dining and dancing in open air, goat-hair tents serving grilled chicken, hummus, flatbread while the B'doul entertain them with tradition songs and string

instruments (rubaba). This exposure to Bedouin culture has propagated the creation of similar venues and businesses across southern Jordan, and many of the B'doul can be found involved in these new tourist ventures.

Also, tours have been setup to run from the nearby town of Wadi Musa into Umm Sayhoun to provide tourists with an “authentic” experience in Bedouin culture. Most of the new changes that are taking place internally are for touristic development. Travel agencies, information centers, tours, and lodging (bed and breakfasts, and small hotels), are becoming mainstream in the village. Umm Sayhoun is quickly becoming a powerful example of tourism effects on villages near high profile areas like Petra.

Since the population of Umm Sayhoun is continually expanding, the Bedouins are in constant need of more land for cultivation. Unfortunately, increasing cultivated land is impossible because the lands surrounding the area belong to other tribes or the terrain is non-arable. The majority of the B'doul sustains their lifestyles based on access to tourism within Petra. Some areas have been set aside within the valley to allow for shops to built and maintained. These areas are now “owned” by many B'doul within Umm Sayhoun or in partnership with non-bedouin Jordanians. This is important since ownership also implies exclusion. There are many Bedouin who have little to no access to tourism within the valley. Therefore, their lifestyles, if possible, are still somewhat maintained through subsistence farming and herding, while they are forced to live in Umm Sayhoun. Unfortunately, the lack of arable land and restrictions placed on Bedouin pastoralism outside the boundaries of Umm Sayhoun force a wide disparity in the standards of living within Umm Sayhoun. Many Bedouin are finding it difficult to remain within Umm Sayhoun and have found residency and mobility within Beidha, while some B'doul continue to build onto their already large homes creating multi-story 1,000–2,000 m² palaces overlooking Petra. These disparities in income, possessions, connections (wasta), tradition, and a sense of belonging are broadening, and will only get larger and more challenging to the B'doul, the larger community, and the region in general.

4.5 Implications and Suggestions

It should be clear that this population has been influenced and affected heavily by the growth in tourism after the declaration of Petra as UNESCO World Heritage site, and more so with the recent vote (21 million votes) as one of the New Seven Wonders of the World. Economically, there is evidence for concern in the stability of this expanding village-town. Questions remain about the future of Umm Sayhoun, the B'doul, and Petra; whether the replacement of traditional Bedouin mobility and subsistence agriculture with settlement and tourism—as the predominant source of revenue—will be sufficient to sustain this rapidly growing village. The paved road into Beidha has encouraged *some* B'doul to return to pastoralism, while the road to Wadi Musa has encouraged some to work in

industries there. However, if the tourism in Petra, Jordan proves to be unsustainable for the surrounding communities due to unforeseen pressures, then the abandonment of subsistence practices will leave the B'doul to struggle. The new standard of living provided by tourism and settlement will be reduced drastically.

The new village-town of Umm Sayhoun has provided numerous benefits to the B'doul. Immediate access to healthcare and education has greatly influenced the population growth within Umm Sayhoun and educational participation throughout Jordan. The original goal of integrating the B'doul within the kingdom, nation, and fabric of Jordan has been met with some success. Many members of the new generation of educated B'doul pursue opportunities in other parts of the country and world.

As of now, the village is limited physically for any future growth. Other than the lack of arable land around the *urban* plateau, the B'doul are running out of land upon which to build. For now, a few of the poorer B'doul members are building illegally on the plateau to the southeast. Also, the limits to future growth may lead some B'doul to return illegally to the caves and tombs in Petra (in fact, some have continually resided in the caves between Petra, the Snake Monument and Jebel Haroun). This will ultimately lead to greater conflict between the B'doul and local authorities, returning them to the policy concerns and disputes that developed during their relocation. The buildings are expanding vertically which contributes to the village-town being easily visible from across Petra (Fig. 4.5). This already affects the touristic experience throughout the valley.

As the town population grows faster and faster, the number of B'doul entering the work force will increase. These B'doul will expect and plan to work within this unique service and retail industry. Studies need to be conducted to investigate the balance of the B'doul, to their learned skills, the active workforce, changing jobs and needs, and the overall opportunities for work in Petra, Wadi Musa and Umm Sayhoun. Increases in the number of workers in the valley will place strain on those working families already established in the valley, adjacent towns, and tourism-related businesses. This will undoubtedly create new friction between the B'doul, their coworkers, and their Jordanian competitors, in addition to new policy conflicts between the B'doul, local authorities, future regulations, and within the B'doul community itself.

Upon their relocation from Petra to the plateau above in the 1980s, one of the original purposes of Umm Sayhoun was to assist in the integration the B'doul Bedouin within the broader Jordanian community and society. Currently, the major problems presented here underscore a weak vision and direction for Umm Sayhoun, and the limitations of the diversification of opportunities for employment, or sources of income for its Bedouin residents. The growth of Umm Sayhoun requires enforced management of current (Fig. 4.6—structural placement) and future regulations (possible zoning requirements). Effective urban planning integrates land use, activities, transportation, infrastructure, and education to improve the built, economic, and social environments of communities—Umm Sayhoun would benefit greatly from this type of foresight and strategy. Simple measures in creating land use zones, improving infrastructure, enforcing planning policies, and actively involving community elders and residents would be a dramatic first step.



Fig. 4.6 Original map (1980s) of the village of Umm Sayhoun before relocation from Petra to the village [1]

Also, the current educational opportunities are limited within the village. Since the Umm Sayhoun’s inception, the B’doul have become more isolated from other local communities within the region, and within Jordan. When the B’doul lived within the valley, all of them interacted daily with the visiting foreigners, however now within the village-town, there are many residents who no longer regularly intermingle and “network” with the visiting Arabs, Westerners, Africans, and Asian who frequented Petra then and now. The emerging world of global tourism and industry requires a broad foundation, and formal secondary and college education may be an answer. Scholarships or government-funded grants for the B’doul could be made available to them at new local colleges such as Al-Hussein Bin Talal University in nearby Ma’an. In 2004, a branch of Bin Talal University opened its College of Archaeology, Tourism & Hotel Management in Wadi Musa and a number of B’doul have been successful in matriculation and graduation. This new opportunity will help the B’doul to diversify their skills, represent a stronger candidate in a dynamic global workforce, promote involvement outside of Petra and Umm Sayhoun, and reduce competition for service industry jobs within Wadi Musa and the valley of Petra.

Ultimately, the success and sustainability of the B’doul and Umm Sayhoun lies in the creation of a strong vision for their future and opportunities. Improvements to Umm Sayhoun through urban planning and infrastructural mitigation, in conjunction with improved, and accessible educational opportunities may be the key to the future of B’doul Bedouin of Petra and their sprawling town of Umm Sayhoun.

Endnotes

1. For more information on other Bedouin tribes surrounding the Petra Archaeological Park (PAP), see Farajat’s [Chap. 7](#)—this volume.
2. For a detailed narrative of events that took place during these “reorganization” efforts, see Farajat’s [Chap. 7](#) section titled “Management Policies and Practices: Impacts on Local Community”—this volume.

3. Farajat's [Chap. 7](#), section titled "Infrastructure Development and Access to Services"—this volume, provides further information on infrastructure improvements throughout Wadi Musa, Taybeh, and Beidha.

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Author Biography

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His research has taken him to Tunisia, Jordan, and Morocco and various parts of Europe and his expertise has been requested by numerous international public and private agencies including UNESCO, US State Department, and ICOMOS.

Chapter 5

Hydrology, Human Occupation, and Preservation on the Landscape of Petra

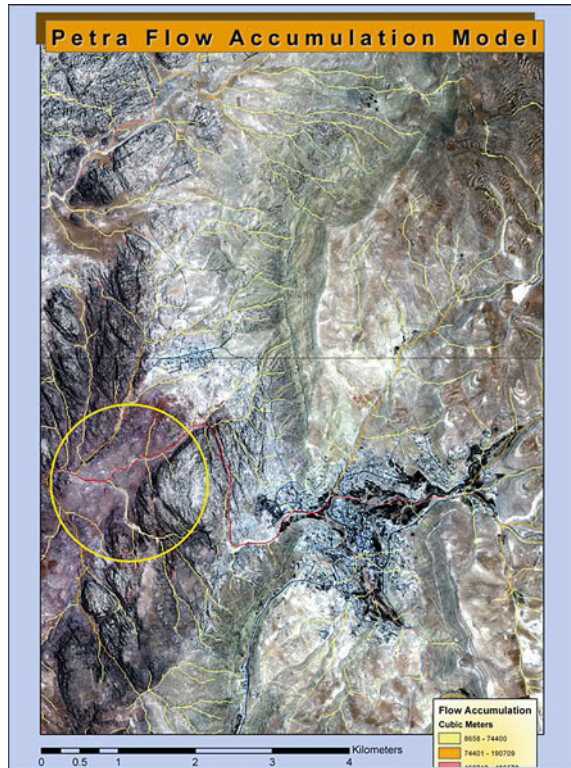
Douglas C. Comer

Water has always played a central role in the human occupation of the high desert in which the Petra World Heritage Site is located. Precipitation in the Petra region is meager today, about 200 mm per year, and there is no indication that it was greater during the Nabataean era. The rocky, steep terrain, however, channels both precipitation and water from a number of springs to the wide canyon in which the ancient city was constructed. This can be seen in Fig. 5.1. In this image, the core area of the ancient Nabataean city of Petra is indicated by a yellow circle. Flow accumulation has been calculated in cubic meters of water, and volumes of water are color coded from yellow (least) to dark red (greatest).

Precipitation on the enormous limestone formation of *Jabal Shara* to the east of Petra flows down to the terrain in which the city was constructed. This mountainous terrain reaches an elevation of 1,600 m. The city center of Petra is situated in a sandstone formation, about 1,000 m at its highest point. A characteristic of sandstone, of course, is friability. Seismic activity has produced cracks in the sandstone, and water moving through the cracks eventually widening them into narrow canyons and broader valleys. These provided shelter and environmental diversity. To the Nabataeans, they also provided material for tombs and standing structures. Tombs were carved into the sandstone walls and standing structures built from blocks cut from the walls.

Water flowed above ground through *wadis* that continued into the canyons and valleys. Below ground, it flowed through aquifers, rock that absorbed and therefore provided a medium for the movement of water. The subterranean water came to the surface at certain places. Many of these places were along the interface between the limestone and sandstone formations. This interface is called by geologists an “unconformity,” an alignment along strata where older and younger rock meet, in the absence of rock from intervening geologic periods. Along this unconformity are springs, also called sources or, in Arabic, *ein*. These are, therefore, slightly upslope from the maze of sandstone canyons and valleys. Figure 5.2 displays these geological zones, as they were extracted from synthetic

Fig. 5.1 Landscape surface model of Petra region. Water accumulates within the area of the red rectangle, which contains most of the famous monuments of Petra

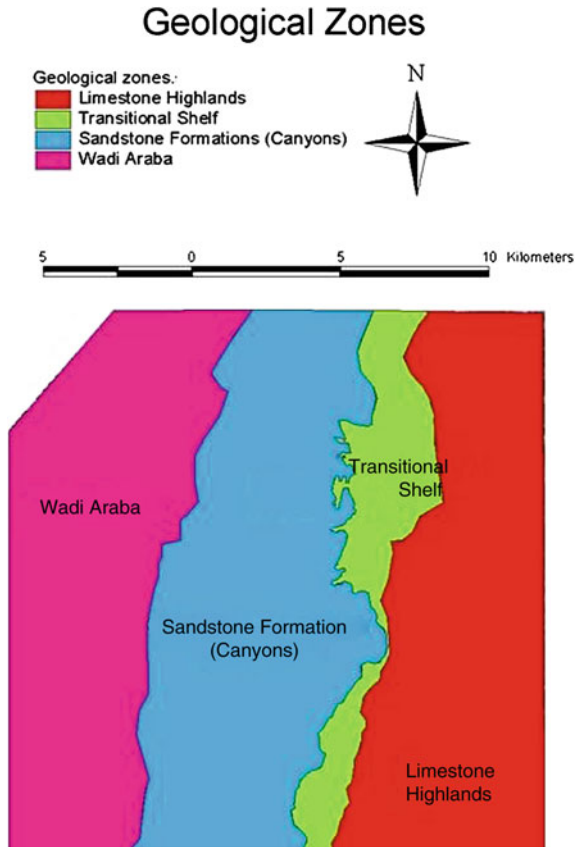


aperture radar imagery (SIR-C/X-SAR) imagery produced from data collected by the space shuttle Endeavor.

5.1 Water and Human Occupation

The watered canyons and valleys provided shelter from winds and the extremes of cold and heat. Because they are aligned in different directions, they provided a variety of microenvironments. Nearby Petra is Wadi Araba, a section of the Great Rift. The Great Rift is also found in Africa and continues to the north, forming the bed of the Jordan River. The Great Rift has been a route for the migration of animals, humans, and hominids for millions of years, crossing through numerous environmental zones in which an enormous variety of plants and animals is to be found. Only a small minority of plant and animal species can be domesticated, or in some cases are worth the effort. Such domesticatable species were among those that moved up and down the Great Rift. Domestication is a process that involves structural change to animals and plants that are being domesticated. Some of these

Fig. 5.2 Geological zones determined from the analysis of synthetic aperture radar imagery developed from data collected by the SIR/C-X/SAR sensor carried by the space shuttle endeavor



domesticatable plants and animals were very likely being carried along the Great Rift by human groups who were making use of them in their fully or partially domesticated form, or even before they were domesticated at all. The core and nearby areas of Petra would have been attractive to human groups for reasons just described. By human or other means domesticatable animals and plants arrived long ago in the area in which the Petra Archaeological Park and World Heritage Site is now located.

Beginning as early as about 13,000 years ago, small Natufian settlements appeared within what is now regarded Petra Archaeological Park. These might not have been occupied on a year-round basis, but were a step toward fully settled way of life for human groups. The inhabitants of these sites were collecting plants and hunting animals that were later fully domesticated. Villages that were occupied on a year-round basis were established a few thousand years later through cultural processes that archaeologists still debate. Kuijt and Finlayson [2], for example, argue that granaries were built even before full domestication of plants to store grain collected from wild plants. The need for collective social action to build,

Fig. 5.3 Bell-shaped Edomite cistern



maintain, and guard these facilities would have provided a powerful incentive for sedentism. Whatever the case, Pre-Pottery Neolithic A villages emerge soon thereafter. These were large and located only in ideal places for agriculture. As animals were domesticated along with plants, many more villages appeared. These Pre-Pottery Neolithic B villages were much greater in number. Within the Petra World Heritage Site and Petra Archaeological Park are such villages. Some, including the well-known site of Beidha, where tourists visit today, have been found on the eastern edges of the sandstone formation, just down slope from many of the springs in the area today. There might be a preference for this area because of the availability of water there. Thus, many early human occupation sites might now lay beneath Nabataean ruins and the remains of other archaeological sites that were left behind by other, later human groups.

Between the Natufian and the Pre-Pottery A and B occupations were many others, and as time went on they altered the landscape to better direct and concentrate water for human use. We have good archaeological evidence of this. It is likely, of course, that at least some minor modification of water flow as instigated by even Natufian, Pre-Pottery Neolithic A, and Pre-Pottery Neolithic B groups. The Edomites, for example, excavated bell-shaped cisterns (see Fig. 5.3) even at high points in the sandstone formation, allowing them to build villages there. We can see, then, that a tradition of water exploitation and management existed for many thousands of years in the Petra region before the ancient city of Petra was constructed about two thousand years ago. It is generally accepted that water management reached its apex during the Nabataean occupation of the area. The traditional name for the mountain to the east of the ancient city of Petra is *Jabal Shara*, or the mountain of Du-Shara, which is principal male deity of the Nabataeans. This is possibly an acknowledgment by the ancient Nabataeans of the importance of the mountain as a source of life-giving water. We know that Nabataean temples in the region north of Petra typically show the pairing of a female deity of fertility, Atargatis, with a male deity representing rain and thunder, Hadad. These deities became important to the Nabataeans as they increasingly practiced agriculture. In the logic of religious iconography, gods and goddesses representing certain attributes are often conflated with others sharing those traits. Atargatis, for example, is very similar in some ways to Ashtart, Anat, Asherah, and even the familiar Greek Venus. Identities are sometimes fused, as well, in a

Fig. 5.4 Field systems upslope from Beidha, 7 m north of the core area of Petra, where urban development has not yet taken place



phenomenon known as syncretism. Some have speculated that an Arabian goddess, al-Uzzah, was an incarnation of Atargatis, at least to the extent that both represented fertility. Al-Uzza was the consort of Du-Shara, the preeminent god at Petra. It is certainly possible that Haddad was conflated with Du-Shara at certain moments in history, just as Du-Shara seems to have been conflated with Zeus at certain times. Indeed, depictions of all three are similar. In the ceremonial approach to Petra through the narrow canyon of the Siq is a niche in which a figure representing Atargatis can be seen.

In satellite images of the slopes to the east of the sandstone formation, we can see field systems (Fig. 5.4). These systems conform in design to those that have been dated to the Nabataean period elsewhere. We know, also, that barrage dams and channels were constructed by the Nabataeans to direct water into cisterns and reservoirs, of which there are many throughout the ancient city (Fig. 5.4). The water was used for many purposes, water for drinking and cooking, to be sure, but much more water for industrial processes, baths, and even monumental displays of water at the Nyphaeum and paradeisos, the latter a veritable water garden that has been found in the city.

As mentioned, the flow accumulation model seen in Fig. 5.1 assumes an annual rate of precipitation that is the same as that as today, about 200 mm. In the ancient world, occupants of cities utilized about 0.6 m^3 of water per person per day, a much larger volume than that consumed by the prehistoric occupants of the area, to be sure, because of the many uses to which water was put in Hellenized or Roman cities. This included not only water for drinking and cooking, but also that used for industrial purposes, baths, and use in public monuments, such as nymphaea and water gardens. If 16.5% of the annual precipitation falling within the catchment seen in Fig. 5.5 were captured, this would be enough to support a population of 30,000 using 0.6 m^3 of water per day. Water obtained from springs would be in addition to this.



Fig. 5.5 Virtually no development is seen at Wadi Musa, the town upslope and to the east of the Petra core in 1953, but has clearly taken place by 1993. Since 1993, development in Wadi Musa has increased greatly

Clearly, however, the water management system did something in addition to all of this. It channeled water away from tombs and standing structures. The Nabataeans, masters of stone carving, would have known well the characteristics of the material with which they worked. There were, in fact, seven different types of sandstone from which they made their creations, and all were to a greater or lesser extent vulnerable to water. Water in the Petra environment carries with it salts and other minerals. Water is absorbed in rock, especially by sandstone. After water is absorbed, crystals of salt form as the water dries. The crystals force grains of sandstone apart [3]. Water erodes rock in other ways. On the surface of the sandstone is formed a shell, created when dust from the limestone formation around the city center falls on the sandstone and reacts with it [1]. Eggshell thin at times, the crust is broken by heating and cooling or simply when struck. Water finds its way beneath the shell and erodes the softer sandstone beneath. Eventually, a sheet of sandstone will fall. If this comes from a tomb façade that has been decorated by carving, the carvings are lost, as well.

5.2 Development and Hydrology

Around the world, ecologists and environmentalists are concerned with the proliferation of impervious surfaces. Roads, parking lots, houses, shopping centers; practically anything humanly built tends to be impervious to water. In places where water once soaked into soils and nurtured plant and animal life, it now runs rapidly downhill, with little to slow it. The water also often carries with it the debris and chemicals associated with contemporary human life, gasoline, oil, and

chemical for various kinds that might have been used to encourage growth of introduced vegetation.

At Petra, water has been perhaps the greatest factor in attracting human occupation. Over millennia, as we have seen, human groups engineered systems to direct water to locations where it served human purposes and away from locations that could be damaged by water. As these systems have been compromised, water has become a force for destruction.

The pair of black and white aerial photos seen in Fig. 5.5 clearly illustrates the degree to which the area between the limestone highlands and the sandstone formation in which the most important tombs and structures of Petra were built has been altered by development. The black and white aerial photo taken in the 1950s shows almost no contemporary development, today the area is covered by hotels, houses, shops, restaurants, parking lots, and roads. Not only have impervious surfaces been introduced, but they have also destroyed and replaced the buffer that fields, barrage dams, and channels built by the Nabataean once provided. While the Nabataean water control features slowed the movement of water from higher to lower elevations, the impervious surfaces actually increase the velocity of the flow by removing impediments, and increase the volume of flow because water is not absorbed by soil or plants.

Consequently, storms occurring far up the Valley of Moses (Wadi Musa) where the town of Wadi Musa is located can produce flash flooding in the town, even when it is not raining there. In 1999, a flash flood occurred in this way. Unaware of the danger, two young men walking down the road that runs alongside Wadi Musa were swept in the torrent that suddenly raged through there as it overflowed the banks of the wadi; the body of one of the young men was carried to the center of the ancient city, some 2 km distant. Figure 5.6 shows the damage to the road alongside which the boys were walking.

The only remnants of the Nabataean field system that remain in the immediate vicinity of Wadi Musa are those on slopes too severe to accommodate modern development easily. These can be seen in Tasseled Cap images (such as that in Fig. 5.7), and by viewing them in this way one can see the design of these field systems and infer the intent of the design. Blue areas are those of bright returns, that is, electromagnetic waves of certain types are strongly reflected by the naturally impervious rock surfaces along which water made its way to terraces constructed by the Nabataeans. The terraces, of course, slowed the descent of the water, accumulating by doing this not only water but also soil. Wetness is indicated by the color red in a Tasseled Cap image. “Greenness” in a Tasseled Cap image is assigned the color green, and so vegetation, which tends to be green, is indicated by that color. On the terraces, then, we see both wet and vegetated soil.

Clearly, a water management system would have to be both complex and comprehensive to capture as much water as was needed by a city as large as Petra, and the agricultural fields upslope from the city would have formed in effect a second line of defense against flooding. As the water capture and the agricultural systems have been destroyed by development, water has damaged archaeological resources in several ways. The first of these is simply by the force of water and the



Fig. 5.6 Flash flood damage in Wadi Musa

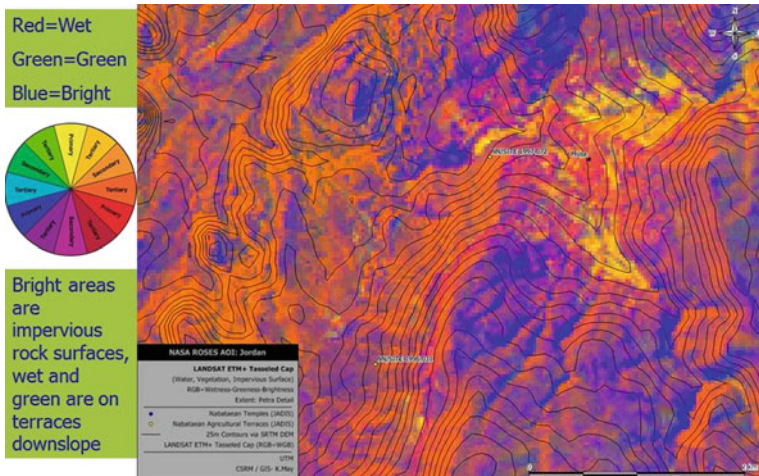


Fig. 5.7 Tasseled Cap image showing Wadi Musa (on right) and Bab el-Siq, the entryway to the Siq in Petra. Blue is largely impervious rock surface, orange vegetated Nabataean terraces, and yellow introduced vegetation at Wadi Musa

debris carried by water during flooding. During a 2001 rain event, a veritable waterfall crashed into the canyon in which Al-Khazna is carved. Water itself is an agent of erosion, and fast flowing water and water falling from great heights erodes rock more quickly than slow moving water does. Any material carried in the water



Fig. 5.8 Effect of salt-laden water wicking into sandstone is visible here. This kind of damage occurs from the ground up. Note keyhole shape of tomb entrances

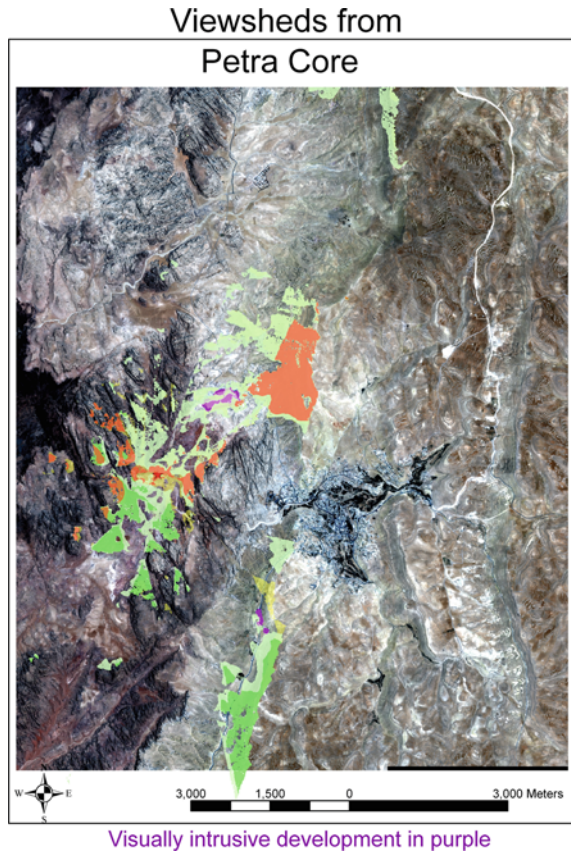
increases friction and if heavy enough can cause additional damage simply through the impact of striking rock faces. As mentioned above, cracks in rock faces provide access for water to softer stone beneath the crust that forms on sandstones at Petra, which eventually results in the spalling away of the outer surface of rock.

As outlined above, the second way that water destroys the monuments at Petra is by carrying salts and other minerals to them. Even slow moving or pools of water can cause major damage in this way. Water containing destructive materials is wicked up into stone. The effects can be seen very clearly in Fig. 5.8. Note the distinctive keyhole shape of the tomb entrances. More stone is lost at the bottom of entrances because more water is absorbed there and the surface of the stone undergoes a wet dry cycle.

Finally, the flooding that is greatly exacerbated by construction upslope from the ancient monuments affects not only the monuments, but also subsurface archaeological deposits. After major rain events, wadis suddenly appear in the heart of Petra where there were none the day before. The author has observed these to be 2 m or more in depth. They disappear quickly, filled in by earth moving equipment, which of course further disturbs subsurface archaeological deposits. Therefore, while such episodes of flooding, erosion, and cutting and filling affect tourism very little because they occur only a few days out of a year and perhaps in some years not at all, they do irreparable damage to the archaeological record.

The preference for developing upslope from the core of the ancient city is understandable; tourists value a view, and especially a view of the site that they are visiting. One can charge more if one provides this. Beyond the profit motive, in fact, the desire for a view has in several cases overwhelmed the cause of preservation even among administrators, who have constructed offices occupying locations with panoramic views of Petra, and archaeologists, who lodge excavation crews in buildings in Um Sayhoun that have pleasant views of the core of the ancient city. Figure 5.9 is a viewshed map. Areas of different colors are those that can be seen from the core area of the ancient city, depending upon the height of buildings there.

Fig. 5.9 Visually intrusive development in *purple*



What can be seen from the Petra core are, reciprocally, the locations that provide a view of the Petra core. This is problematic, then, not only from the standpoint of introducing views of contemporary structures in the ancient city, but also from the standpoint of water management. What can be seen is much more likely to increase the flow of water into the ancient city.

5.3 Solutions

Water flows downhill. Water flowing into Petra has done great damage to archaeological resources there. To lessen or arrest the flow of water into Petra that is producing this damage, one must take action in the landscape above the ancient city. It is almost certain that there are engineering solutions to this problem. More precise models of the landscape than the one presented here can be made, for example with LIDAR technology. LIDAR data could be collected from an aerial

platform for a tiny percentage of the funds expended each year to promote tourism. Engineers using that model could develop ways to lessen the volume and velocity of water flowing downhill, and divert that flow from the monuments in Petra. Implementing such an engineering solution will, as always, require not only political will, but also the administrative skill to work with stakeholders who will be affected by the solution. These tasks are not trivial, but unless they are successfully undertaken, the pace of destruction of archaeological material in Petra, which has accelerated with the successful marketing of the site to international tourists, can only be expected to increase even more.

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Chapter 6

The Environmental and Cultural Heritage Impact of Tourism Development in Petra–Jordan

Talal S. Akasheh

6.1 Introduction

No one argues the importance of the development of tourism for the benefit of indigenous populations around historically important sites. However, sustainable tourism requires the implementation of tourism development plans without infringing on the integrity of cultural heritage sites. Thus, there is a right way for tourism development and there is also a wrong way. Unfortunately, the development of tourism and its infrastructure in Petra have gone astray in more than one way. In the aftermath of the signing of the peace treaty between Jordan and Israel in Wadi Araba (1994), Jordan was literally caught with the lack of an appropriate plan for tourism development to meet the rising demand with the sharp increase of tourist arrivals. Surely, there was a Master Plan prepared by UNESCO [1] for the conservation of the Petra site and its monuments, and Petra had already been placed on the World Heritage List, but unfortunately, as with many plans prepared by foreign experts, the scheme was too ambitious and required huge resources that Jordan could not afford to raise. With the increasing tourism pressure, a frenzy of unchecked development took place, in an attempt to implement hastily prepared development plans aimed at the establishment of tourism infrastructure. This chapter focuses on the negative impacts of tourism development while recognizing the importance of reaping the benefits of tourism especially in the poverty-stricken region surrounding Petra. The chapter also illustrates the use of GIS in assessing environmental and cultural heritage impacts of tourism.

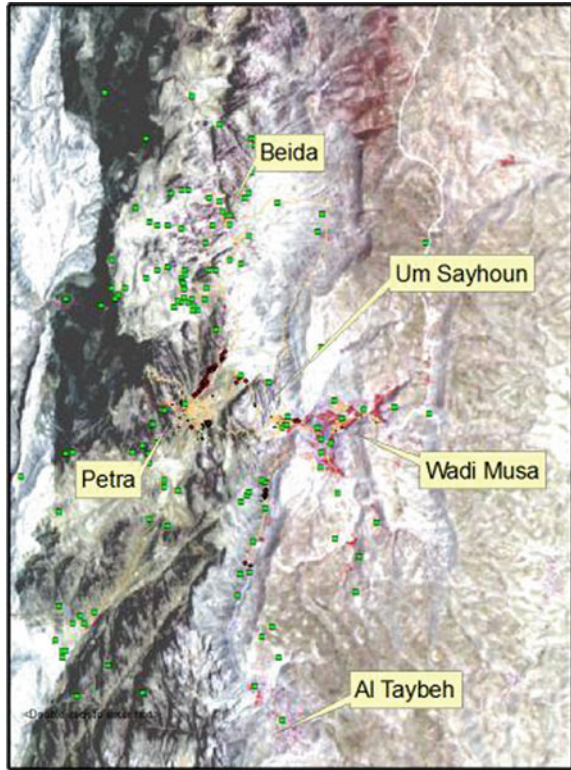
6.2 The Region of Petra

The monuments of Petra were carved from the cliffs surrounding a plateau, of roughly 850 m elevation above sea level. The sandstone formations at this level are of Cambrian origin. At slightly higher elevations, white Ordovician sandstone formations are found. Some of Petra's monuments were carved at this level as well. Outside Petra and on top of the Ordovician layer lie mostly limestone formations that contain several water sources that fed the ancient city through a system of canals and clay pipes. In addition, the Nabataean harvested water using dams, cisterns, and *wadi* (valley in Arabic) barriers as well as agricultural terraces. The steep limestone formations that rise to about 1400 m above sea level are known as the Sharat Mountains. To the east of Petra lies Wadi Musa Village, which witnessed considerable urban expansion and tourism development in the nineties. To the north and directly overlooking the site, a village, Um Sayhoun, was built in 1983 following a plan by a World Bank project, to house the Bedul tribe that used to live in the caves of Petra. North to Um Sayhoun, a Neolithic site was discovered as well as a small group of rock carved monuments (Ordovician) known as Bheida or Mini Petra (also Little Petra). To the east of Bheida, a rural or suburban area has been utilized in ancient times for agriculture with dams and terraces as well as extensive defensive structures that lie high on the tops of the Sharat formations. Further north, a thick Oak forest (the Hisheh forest) represents the scarce but healthy vegetation that exists in the region. Thinly distributed in the higher areas of the region, *Phoenician juniper* trees are found to the north and south of Wadi Musa. A modern road connects Wadi Musa to Um Sauhoun and Bheida, and the road continues west to Wadi Araba, and east to the Hisheh forest. A modern road to the south of Wadi Musa leads to Al Taybeh village. In the map below (with an IKONOS image as background) (Fig. 6.1), the villages are shown together with the above-mentioned roads. The points in green are archaeological sites that have been surveyed by the JADIS project, an effort implemented by the American Center for Oriental Research (ACOR Amman) and the Jordanian Department of Antiquities. It is quite obvious that cultural heritage sites are not restricted to Petra and are widely spread around it as well.

6.3 Urban and Tourism Infrastructure Expansion/Development and Their Impacts

One of the earliest projects aiming at the conservation of the Petra site was a World Bank funded project implemented by the National Park Service of the United States. A major conclusion of the project was that the Bedouins who inhabited the caves of Petra had to be relocated if any protection and improvement of the site was to be achieved. Unfortunately, the site chosen directly overlooked Petra and soon

Fig. 6.1 Map of the region with a Landsat TM7 Image as background. Area is $15.17 \times 22.7 \text{ km}^2$



ugly concrete structures were to be seen from inside of Petra. With the large population growth (characteristic of the traditional Arab society), the village expanded haphazardly, and attempts by authorities to control this sometimes led to civil unrest and even violence. What is worse is that a number of inhabitants built two- or three-storey buildings and converted them into low cost hotels, specially serving foreign archaeological excavation teams. Built in 1983, the village is still a sore spot that causes scenic pollution. In Comer's article in this publication one can see the viewshed that shows this impact. Children from the village are in the habit of leaving school and climbing down the slope to sell worthless trinkets to tourists, but sometimes even illegally acquired ancient artifacts.

In the 1980s, only two hotels were known in Petra, the Government Rest House and the Forum. Both were built in a discrete manner using stone that fitted reasonably well with the natural environment. In the early 1990s, several new and modern hotels started cropping up on the Al Taybeh Road. They directly overlooked the Petra site and some of them could be seen directly from the archaeological site again infringing on the natural and geologic beauty of the site. After the signature of the peace treaty, it became necessary to start planning for the high number of tourist arrivals expected. A Petra Regional Authority was created to develop the region and laid out land use plans aimed at protecting the

archaeological site. Earlier on, the UNESCO Master Plan laid out an Archaeological Park Boundary. However, the work of the Authority was often challenged by property owners, who considered it their right to reap the economic benefits of neighbouring an important site such as Petra. To the present day, it is still difficult to strike the proper balance between the economic needs of property owners and the protection of the site. In 1996, once again the World Bank supported a Master Plan [2] for the development of infrastructure to serve the expanding tourism sector. Among other things, the Wadi Musa-Al Taybeh road was widened. Little consideration was given to the conservation of the site and, while an environmental impact study was conducted, some serious outcomes resulted from the implementation of the project. For example, the cuts made into the flanking hills of the road to widen it resulted in some loss of juniper trees. The percentage of lost trees was not very high, but what is worse is that all the soil and rubble of the excavations was dumped onto the western cliffy side of the road, thus changing the terrain and risking carrying over the rubble to Petra itself during the rainy season. It is ironic that the development plans were laid out and implemented with large funding, while a Petra Conservation Plan supported by the Bank was prepared several years later and very little funding was invested into its implementation. Furthermore, the plan ended up establishing a Petra Archaeological Park Authority. The plan was too ambitious for the Authority to implement, considering that the financial resources necessary for any meaningful control of tourist activities and conservation of the site were never provided. Nor is the Jordanian Government providing any substantial funds for this Authority. In fact, the budget of the Authority does not even reach the 1% of the total yearly revenues made from entry tickets to the site.

The boom in tourism attracted investors from the richer parts of Jordan, as well as from abroad. Real estate speculators started buying land from the indigenous population and even invested in smaller hotels or restaurants. In addition, some of the local landowners managed to establish businesses, such as small hotels, restaurants, coffee shops, and even travel agencies and tourism services: guides, camel rides to the desert, etc. It also became common for some families to offer their homes for bed and breakfast. As a result, there was a big boom in the construction business as well as an expansion of the road network. Urban expansion went unchecked. Ugly concrete and sometimes modern stone buildings started ruining the beautiful landscape that once was Wadi Musa. Even attempts to paint the concrete with a pinkish colour failed to blend well with the natural setting. What is worse is that the expansion of concrete and asphalt areas increased the risk of seasonal flash floods, and the disappearance of soil, so necessary to retain moisture and reduce flow, increased. This problem had been addressed by the Ancient Nabataeans by building a tunnel to the north of the main gorge entrance of the city, the Siq. The Government (following the death of several French tourists in the early sixties) reopened this tunnel, and for a while, this measure was sufficient to protect the Siq. Naturally, in the nineties this was no longer enough. Several measures were taken to address the flashflood risk, and only time will tell if the problem has been completely eradicated.

While expanded urbanization posed its own threats, such as the increased demand for the scarce water resources, inappropriate services also caused an increase in solid waste problems. Solid waste disposal was solved by moving the disposal site to a remote area. However, up to the nineties sewage disposal was achieved through individual septic tanks that provoked increased threats to the ancient monuments. Population growth and urbanization naturally made matters worse. The French company Électricité de France (1993) made a proposal that suggested the construction of a sewage treatment plant to the west of Petra. This necessitated the construction of an underground tunnel to carry the necessary piping right under Petra. The tunnel was justified by the fact that it would lower the water table under the monuments of Petra. The concept was considered too risky and expensive, and lost against a USAID supported project that seems to have solved the problem. The sewage disposal system that resulted collects the effluent in a low elevation region near the entrance of Petra and pumps it out of Wadi Musa to a higher region several kilometres to the north of Beidha. As a safety factor in the design, the project allowed for two sturdy pumps, one acting as a reserve in case of failure of the other. Unfortunately, an important aspect was ignored: an underground rainwater disposal system should have been installed alongside the sewage system. Considering the long and expensive excavations that took place, this would have saved a lot of expense that could have avoided several serious flash floods that occurred in later years. One aspect of the project that was well addressed was the cultural heritage impact. Archaeologists worked during most of the project in order to conduct salvage works for important sites. In open areas, the piping system was diverted to avoid damage to ancient sites, many of which were being discovered for the first time. Unfortunately, in Wadi Musa itself, this was not possible and here only documentation and extraction of ancient artifacts was resorted to where the path of the piping system and the excavations for it crossed an important ancient site [3–5]. Another project, in which considerable attention to ancient remains was given, was the construction of a hotel based on an abandoned “turn of the nineteenth century” village known as Khirbet Al Nawafleh. The project aimed at the restoration of the old village houses and refurbishing them in a modern fashion to make them usable as hotel rooms. An ancient site was about to be destroyed. However, Jordanian archaeologists, who were documenting the site and trying to conduct salvage operations, managed to convince the investing company to salvage the whole site and integrate it within the Beit Zaman hotel construction [6–9].

Finally, the construction of a modern Archaeology and Tourism Faculty Building, in the middle of Wadi Musa near the entrance to Petra, by the Al Hussein University in Maan was a blow to the concept of conservation, considering that this faculty was established to teach Archaeology, Tourism, and Conservation. The building took away land that had long been considered a protected area, being the only spot that was left green in that vicinity.

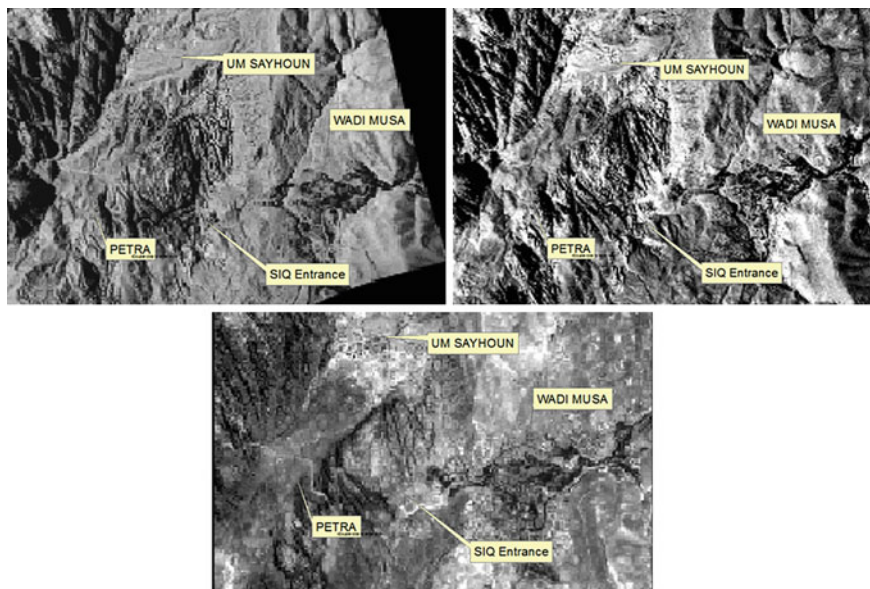


Fig. 6.2 Top left is a US 1968 Corona satellite image ($5.67 \times 4.27 \text{ km}^2$); right is a Russian Zenit 1986 image ($6.34 \times 4.16 \text{ km}^2$); bottom is an IKONOS 2002 image ($6.30 \times 4.14 \text{ km}^2$)

6.4 The Use of GIS and Remote Sensing to Determine the Impacts and Their Extent

It is well established that GIS and Remote Sensing have become the standard tools for spatial analysis and evaluation of environmental impacts. To a lesser extent, they have also been used to study cultural heritage sites. In the remainder of this chapter, we will focus on the use of these tools in Petra and its immediate vicinity. An important application of such technologies is the follow-up of the evolution in time of environmental and geologic parameters. In Fig. 6.2, three satellite images from different times are included. The 1968 images clearly show a small community in Wadi Musa and no housing or construction whatsoever in Um Sayhoun. The 1986 image shows the new community in Um Sayhoun and the expansion in housing in Wadi Musa. Figures 6.3 and 6.4 give an even closer look at the sites. The increased urbanization is very clear in Wadi Musa. On the other hand, Fig. 6.5 shows clearly the dense *Phoenician juniper* tree formations flanking the Taybeh-Wadi Musa road. If zoomed in, the image offers the opportunity to count the exact number of trees in a particular area. Juniper trees were removed to expand the road. Ironically, the building in Fig. 6.5 belongs to the Petra Regional Authority, which was entrusted with sustainable development of the region. The building is a sore spot as it overlooks the Petra entrance and constitutes a scenic pollution, which can be easily seen from the streambed entering into Petra.

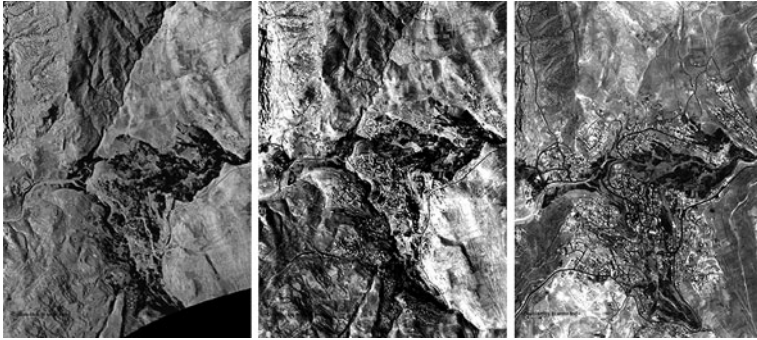


Fig. 6.3 The same images of Fig. 6.2 with a closer look. Area is $2.51 \times 3.39 \text{ km}^2$

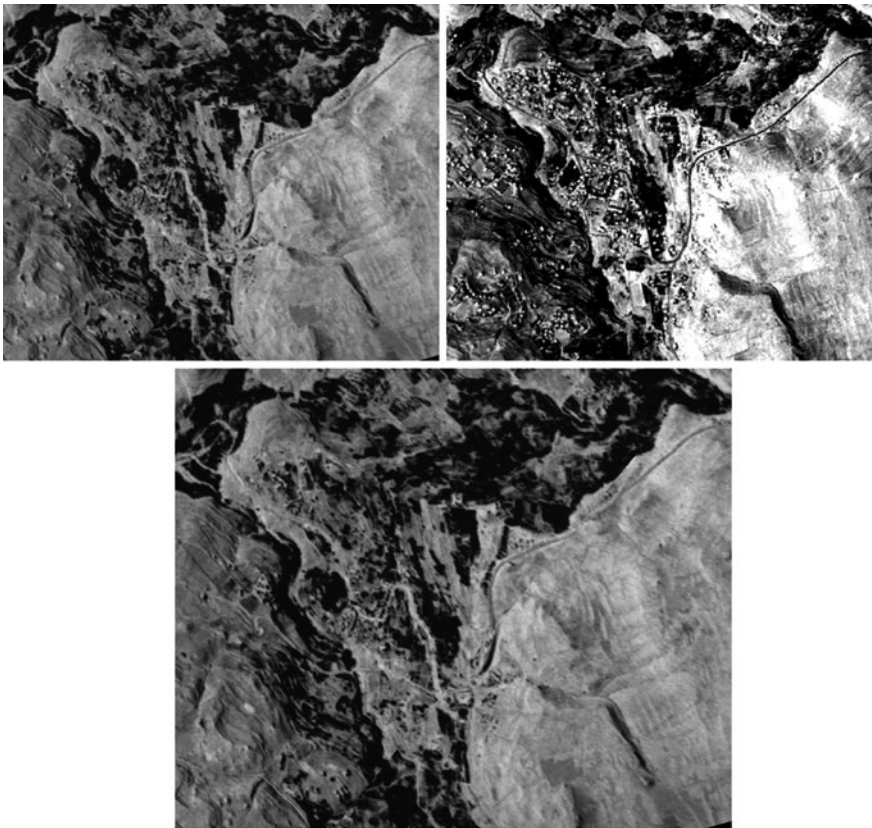


Fig. 6.4 A very close look at the images in Fig. 6.2. Area is $1.16 \times 1.58 \text{ km}^2$



Fig. 6.5 Dense juniper trees flanking the Taybeh Road from the IKONOS Image. Area is $391 \times 225 \text{ m}^2$

Landsat Imagery systems utilize multispectral satellite sensors with NIR, Mid IR, far IR as well as visible sensitivity.

Since chlorophyll in plants absorbs NIR radiation, the images easily detect plants. Thus, this remote sensing facility is capable of identifying vegetation and distinguishing healthy from unhealthy trees [10, 11]. Water completely absorbs NIR making it a prominent feature that is detectable in this imagery system. To simplify plant detection vegetation indices have been utilized to enhance the images. However to simplify the process, the original images are classified using a model called Tassel Cap treatment. To understand this better, old (early nineties) Landsat TM7 images have seven bands, of which the first three are the visible RGB bands. NIR bands are 4, 5, 6, and 7. The Tassel cap treatment makes new linear combinations (sums and differences) of the seven bands and obtains four new bands which enhance the images to show image brightness (band 1 enhancing the principal variation in soil reflectance), greenness (band 2 strongly related to the vegetation cover), wetness (band 3 strongly related to canopy and soil moisture), and finally haze (band 4) (see Erdas Field Guide 1994). Newer Landsat Images +ETM, presently on sale, have nine bands of which the first seven have maintained the multispectral width for each of the first seven sensors as before. Although the colours of the images appear different the Tassel cap results are still the same (several causes for this colour change are involved but this is beyond the scope of this chapter), and the time series comparisons are still valid especially that all images were received with radiometric and atmospheric corrections already applied to them. All imagery, used in this study, was taken on clear days and

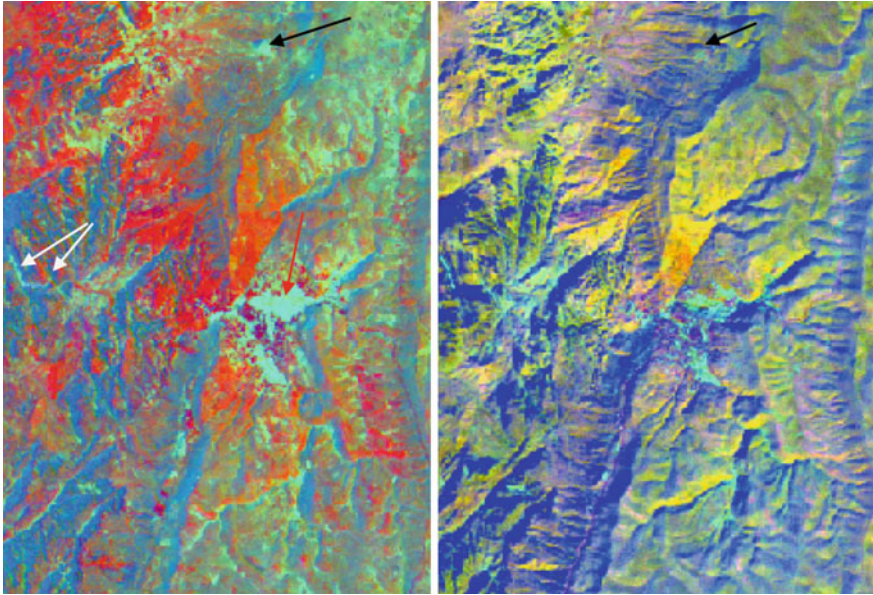


Fig. 6.6 Tassel Cap image from Landsat satellite images. *Left side* is from 1994. landsat TM7, and *right one* is June 2003, Landsat +ETM. *Black Arrow* shows the Dibidbeh water source. *White arrows* show the Wadi Siyyagh water source with the planted thin line of fruit groves. *Red arrow* shows the Wadi Musa fruit groves in light blue. Area is $8.5 \times 11.4 \text{ km}^2$

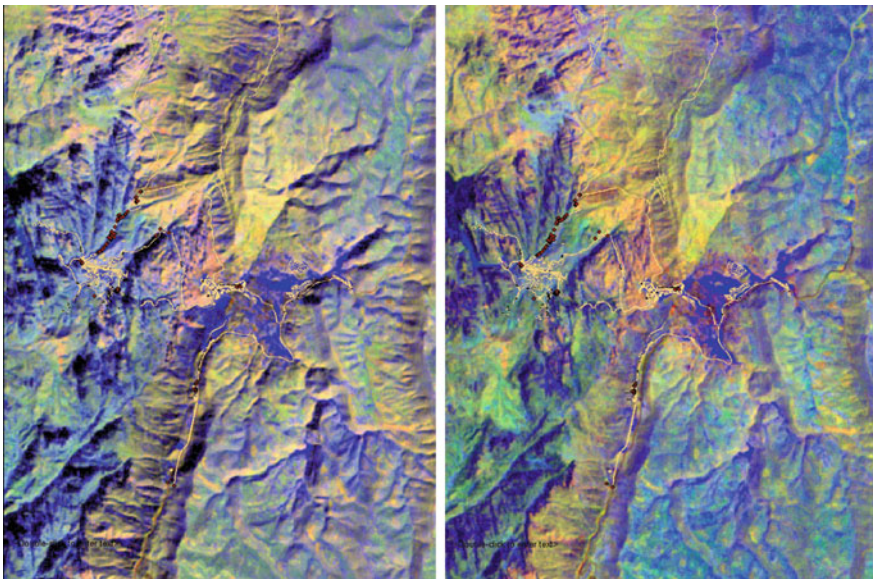


Fig. 6.7 Hydro treated Landsat images. *Left* June 2003, *right* is December 2003. Area is $9.7 \times 12.6 \text{ km}^2$

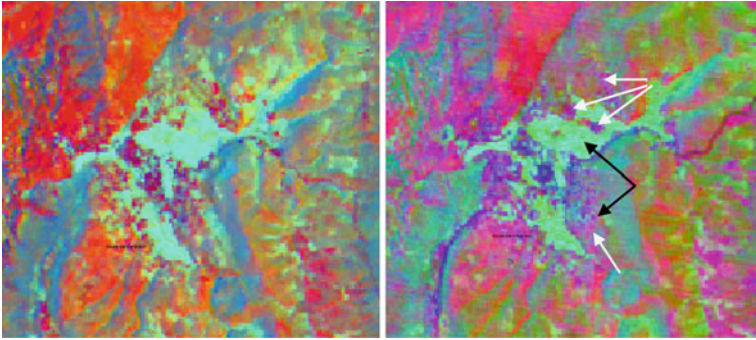
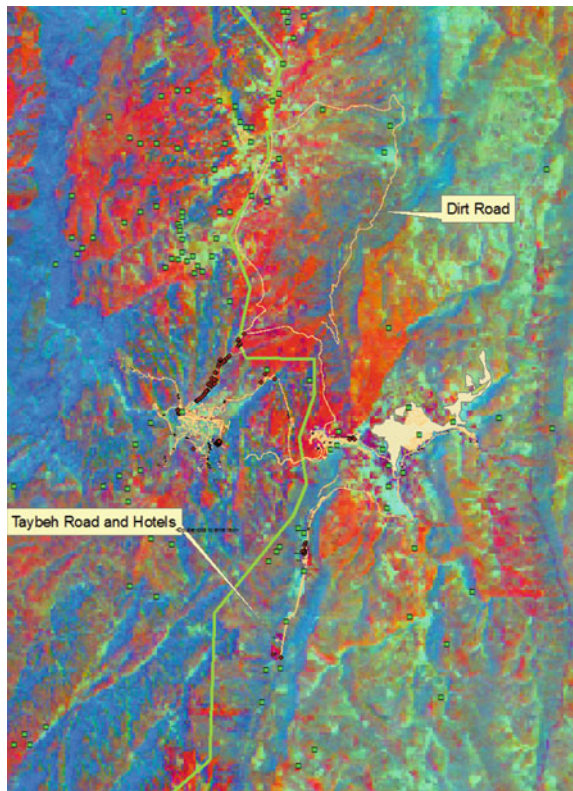


Fig. 6.8 Closer look at the 1994 and 2003 Tassel Cap images the blue green areas indicate that the vegetation cover due to irrigated fruit groves are substantially reduced. *White arrows* show new housing marked by deep red or violet to deep violet colors. *Black arrows* show loss of vegetation. Area is $4.9 \times 5.9 \text{ km}^2$

Fig. 6.9 Predicting the future. *Black arrow* shows the Park Boundary. Area is $10.2 \times 16.0 \text{ km}^2$



therefore no clouds or rainfall were observed in the images. The advantage of this treatment is that, in addition to vegetation, it is easy to detect housing as concrete appears in a special colour (see Erdas Field Guide [12]). Sometimes white rocky



Fig. 6.10 Um Sayhoun as seen from Petra below with some of the important facades known as Mughur Al Nassarah

regions also give the same colour. In Fig. 6.6, a 1994 (left) and 2003 (December on the right) Tassel Cap images are shown. In Fig. 6.7, another type of treated imagery (Hydro model) shows information similar to the Tassel Cap imagery. The Hydro model is another linear band combination that enhances the imagery and the light blue colour in Tassel Cap images is due to vegetation. In the 1994 image, a thin light blue line in the centre left is due to a streambed that has running water due to a permanent water source. The colour is due to the fruit trees that the Bedouins (Bedul) have planted alongside the stream flanks. At the top centre, one can see a bright rather large light blue spot that is due to the presence of another water source (Dibidbeh source) in an abandoned village from Ottoman times. The almost triangular light blue region in the right centre is due to the luscious vegetation of irrigated fruit groves of Wadi Musa village. A dark wine red colour in this area is due to the concrete buildings of the village. Dry streambeds with lot of soil moisture also show healthy vegetation. The 2003 image, while showing different colours still shows vegetation in light blue. Housing is dark blue to dark red. Comparison of both images clearly shows urban expansion at the expense of the vegetation in Wadi Musa. The Dibidbeh source with scarcer and dwindling water output can hardly be seen. A closer look at Wadi Musa in both images in Fig. 6.8 reinforces the conclusion about urban expansion. Juniper trees are shown as either darker off blue or off green left of the Taybeh Road and elsewhere. The 2003 image on the right shows a decrease in the juniper area compared to 1994. In order to project into the future, Fig. 6.9 shows the whole area again. Light orange lines are asphalt or dirt roads. The thick green line is the Archaeological Park boundary.

From the points surveyed by the Jadis Project (shown as green points representing archaeological sites), it is clear that many such sites have been excluded from the park. While until now, most of the development has taken place in the south of Wadi Musa, with several hotels built on the Tayybeh Road, the area between Um Sayhoun and Bheida (especially towards Dibidbeh source) is quietly being eyed for development. Recently, the Government bestowed ownership of land in this region to some of the local Bedouins, and investors from Amman are looking for this land and hoping to buy it. Note that this region has many archaeological remains that still need to be studied. The author happens to be asked for his opinion by several people seeking advice about buying land in the Bheida region. Are we going to see pressure in the future to asphalt the dirt road to Dibidbeh source? Will there be more hotels built in that scenic area that overlooks some of the most beautiful natural scenery in the Petra region? Is the Government going to act soon to plan this region and avoid the mistakes and pitfalls of the Tayybeh Road, or are we going to wait until it is too late, when the private sector starts dictating the future and the pace of development in that region? Just to remind you, Fig. 6.10 shows Um Sayhoun's concrete buildings overlooking some of the finest ancient facades of Petra.

6.5 Conclusions

Obviously, there is a right way to develop a sensitive region and there is a wrong way. This does not mean that only a black and white scale is to be used to arrive at the right approach. No one denies the advantages and positive impacts of tourism development. Sustainable development requires that any development plans need to be sensitive to the conservation of the site and the environment. The values associated with the conservation of the site and its authenticity must be preserved and obviously healthy compromises need to be made. It is the general conclusion of this chapter that the development plans failed to address those issues and a recent World Heritage Committee (May 2011) report indicates that Petra may be soon put on the endangered list if the current practices of tourism promotion and management are not modified to the advantage of conservation. This chapter does not mean to lay blame or send out accusations. More precisely, it states some facts that could help in avoiding future pitfalls. It does focus on the negative aspects but implicitly the positive aspects are not ignored. The negative impacts can be summarized as follows:

- (1) Loss of green cover: irrigated groves, flora in tourist paths and hence fauna. Some loss of juniper trees;
- (2) Loss of scenic views in Taybeh Road, Um Seyhoun. Dumping of soil;
- (3) Septic tanks cause seepage of water to monuments. The sewage treatment plant and its pressurized piping system caused destruction of many

archaeological finds. Only salvage operations were possible in certain areas, and the archaeological sites could not be preserved intact and had to go;

- (4) Poor land use plans: haphazard rush for development;
- (5) Pressures on water resources to cater to hotels and tourists;
- (6) Many houses in Wadi Musa are built on top of archaeological sites;
- (7) Water sources drying up;
- (8) Increased flash floods in winter due to asphalt and concrete in Wadi Musa: threat to life, property and monuments;
- (9) Possibility of pollution of water sources and eventual air pollution;
- (10) Theatre threatened by tourist stepping on it; free mobility of tourists in sensitive places; risk to tourists in dangerous places is also a problem.

What are the necessary measures to improve future planning? We believe that considerable research in the following areas is needed:

- (1) Cultural and environmental resource management;
- (2) GIS and Remote Sensing: monitor and manage;
- (3) Pollution control;
- (4) Risk management in land use planning;
- (5) Tourism statistics and their analysis;
- (6) Carrying capacity of sites;
- (7) Protection and conservation of environmental and cultural resources.

However, research alone is not enough; it is necessary that the relevant Government authorities support this research and do their utmost to benefit from its results.

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Author Biography

Talal Akasheh holds a Ph.D. in Physical Chemistry from UCLA. He has conducted research into the effects of weathering on the stone monuments at Petra since 1982. Since then, he has initiated and implemented several projects studying this phenomenon, and has also conducted a detailed study of Nabataean Painted Fineware. He founded the Queen Rania Institute for Tourism and Heritage at the Hashemite University and has served several years as its Dean. Because of his work on the development of a detailed database and GIS for the Petra monuments, he was awarded the Rolex International Award for Enterprise in Cultural Heritage in 2008. Dr. Akasheh has organized a series of international conferences under the title of “International Conference on Science and Technology in Archaeology and Conservation,” which have met in Europe and the Middle East. He is the Chairman of the Board of WATCH (World Association for the Protection of the Tangible Cultural Heritage) during times of Conflict” established in Rome.

Chapter 7

The Participation of Local Communities in the Tourism Industry at Petra

Suleiman Farajat

7.1 Introduction

Since the listing of Petra as a World Heritage site in 1985, and its naming as one of the New Wonders of the World in 2007, visitor numbers to Petra have increased dramatically. Between 1985 and 1995, visitors to the site increased just under fourfold while today the increase has reached over tenfold reaching just under one million tourists annually.¹ Due to the absence of effective planning and management, tourism volume has become a major challenge for Park authorities, the local community, and the tourist experience itself.

Today, the Petra Archaeological Park (PAP) is the best known and most visited attraction in the Hashemite Kingdom of Jordan, and the resulting tourism industry in the surrounding area has become the main source of income for most local communities in the Petra region, albeit with very different levels of participation among the various communities.

The local communities have experienced rapid population growth in the past 25 years, reaching an estimated 30,000 today.² These communities reside in six main towns and villages: Beidha, Um Seyhun, Wadi Musa, Taybeh, Rajef and Dlagha (Fig. 7.1). The largest of these towns is Wadi Musa, which serves as the main gateway to the PAP. The settlement of Bedouin communities and the development changes that have resulted from the tourism-based economy have imposed cultural and social movement among these communities. To document and preserve some of the traditional knowledge, skills and traditions of these communities, the cultural space of the Amarin of Beidha, Bdul of Um Seyhun and Sa'idiyyine of Dlagha was listed by UNESCO in 2005 among the Masterpieces of Oral and Intangible Heritage.

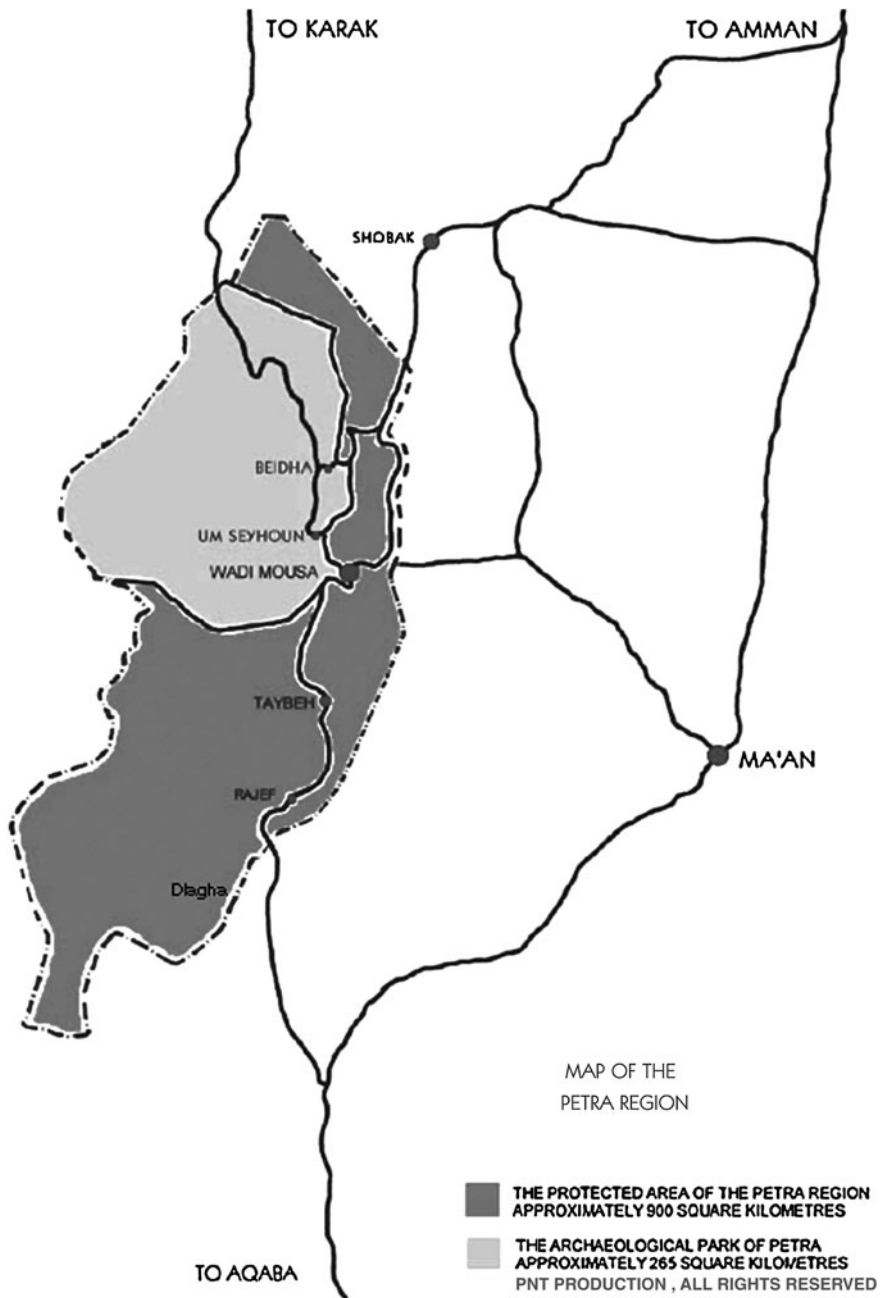


Fig. 7.1 Map showing the six main towns and villages in the region (Courtesy Petra National Trust)

7.2 Petra's Local Communities: Geography and History

The International Cultural Tourism Charter of [1]:“Managing Tourism at Places of Heritage Significance” states, in Principle Four, that host communities and indigenous peoples should be involved in planning for conservation and tourism; and Principle Five states that tourism and conservation activities should benefit the host community [1] (Fig. 7.2).

The history, location, social, and economic development of the various villages impacts directly upon their degree of participation in and benefit from the tourism industry. Lands traditionally owned by Bedouin tribes are referred to as Miri lands, over which the tribes claim influence and “tribal fronts.” By law, these lands are government property.

Beidha is approximately 7 km north of the PAP. It was one of the main suburbs of Petra during the Nabataean period and is considered one of the oldest Neolithic sites in the world. It is the tribal home of the Amarin community. Housing in Beidha was built around 1985–1986 to resettle the Bedouins of the Amarin tribe who were living in Beidha in caves and black tents, primarily in the Siq al-Barid area. Their lands extend from Siq al-Barid to the Hisha area in the east and Siq um al ‘Alda and Ba’ja to the north.

Um Seyhun is the village adjacent to the PAP from the northeast boundary. It was built to resettle the Bdul community, who were relocated out of the PAP between 1985 and 1987. Their lands fall between the caves in the main archaeological spine and Stooth Al-Nabi Haroun to the south. The Layathneh of Wadi Musa claim the same area as their own, which has sparked tribal discord.

The largest town in the region is Wadi Musa and it is considered the gateway to the PAP. It lies along the Park's eastern border and is the tribal home of the Layathneh community. The residents of Wadi Musa are considered the primary beneficiaries of the tourism industry and host the largest number of touristic establishments and services in the region.

Taybeh is the fourth village in the Petra region and the second largest, located to the southeast of the PAP. It has been inhabited by Al-Shrur, one of the Layathneh sub-tribes since the beginning of the last century.

The Layathneh or Bani Layth, a sedentary tribe of more than 20,000 persons, lives in the towns of Wadi Musa and Taybeh. The tribal territory of the Layathneh stretches from the village of Taybeh to the borders of Beidha in the north [2].

Rajef, a small village located on the southern slopes of the Shara mountains, has been inhabited historically by the Rawajfeh tribe. Their tribal territory extends from Rajef to Wadi Al Bataha to the east of Al-Sadah. The Rawajfehs are a semi nomadic tribe of about 2,300 people. Their livelihood is based on cultivation of cereals, olives, fruit trees, and herding goats. Only a very limited number of people from Rajef benefit from tourism [2].

Dlagha is geographically the most distant from PAP, lying to the southeast of PAP. It is home to the Sa‘idiyyine community, who are the historical inhabitants of the village. The Sa‘idiyyine tribal territory extends beyond Dlagha to Sabra and

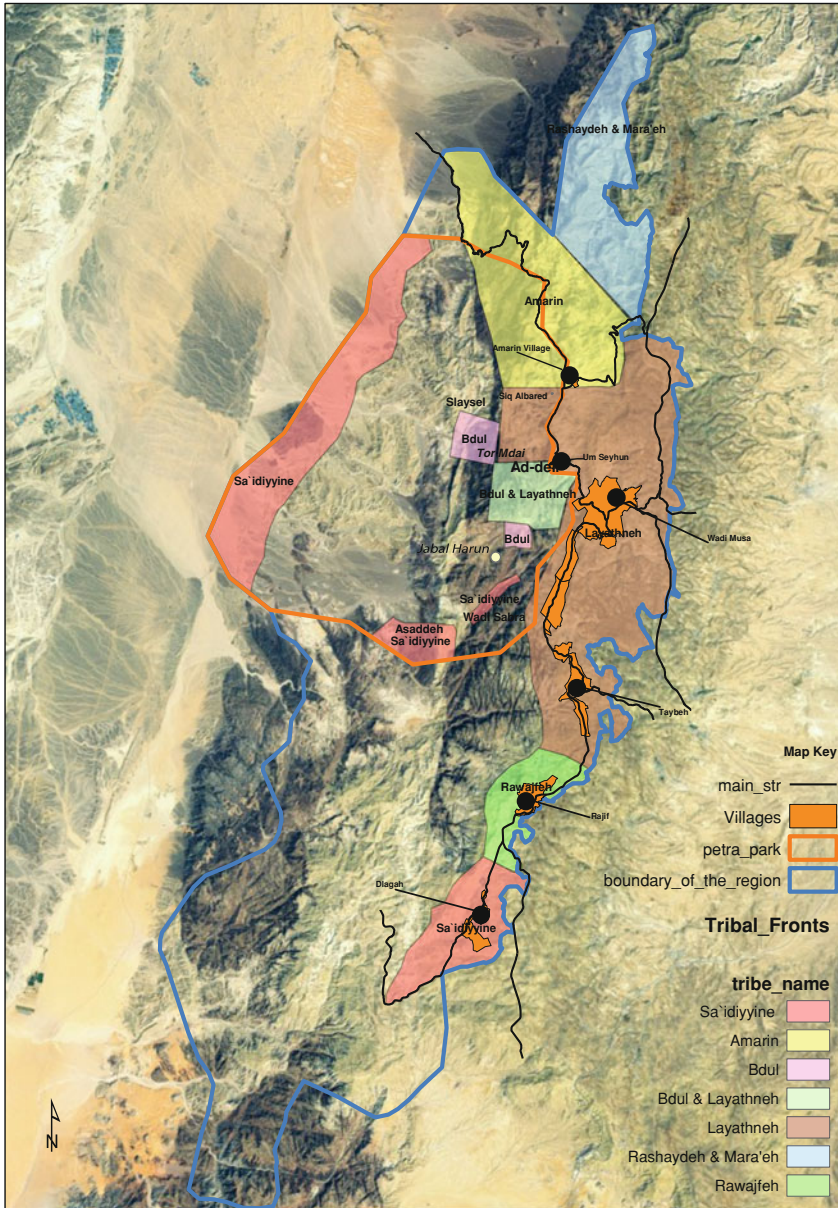


Fig. 7.2 Map showing the geographical features and tribal fronts

Wadi Araba. They cultivate cereals and herd goats, sheep, and camels for their livelihoods, with tourism benefits being out of reach for most.

These six major communities are identified by the Jordanian government, and other international bodies as Petra's local communities. While tourism comprises the main source of livelihood for the majority of these communities, three have benefitted disproportionately, largely as a result of physical proximity to the PAP and regular contact with visitors. These are the Layathneh in Wadi Musa, the Bdul at Um Seyhun, and the Amarin in Beidha.

7.3 Cultural Importance of Local Communities

The overlap of settled and pastoral lifestyles among the tribes of Petra, interaction with other communities and the demands of tourism has brought about changes in the social and cultural life among the local communities of Petra. Settlement and the resulting services it offers, education, housing, health, has eroded some of the skills and knowledge these communities had developed over the years. This knowledge is under particular threat due to its very nature: it being transmitted orally from one generation to the next.

Local communities have acquired over generations specific knowledge related to the natural heritage of the area, the flora and fauna, 'traditional medicine, camel husbandry and tent-making craftsmanship, tracking and climbing skills, and rituals of coffee-making and hospitality.'³ The three tribes covered under the cultural space, namely the Bdul, the Amarin, and the Sa'idiyyine, to this very day utilize traditional Nabataean water-collecting cisterns and caves near Petra.

In addition to a 'complex moral and social code', the relationship these tribes have with the geography and history of Petra inspired a 'rich mythology manifesting itself in various forms of oral expression. These comprise poetry, folktales and place-naming, songs as well as the art of story-telling.'⁴

Petra was rediscovered by Burckhardt in 1812 and it took almost two centuries to discover, study, visit, and classify the site. But within mere decades since 1985, the site became a major destination for international and Middle Eastern tourism. The changes over these decades forced rapid and difficult adaptation for the local communities. If Petra was unknown to the Western world until the beginning of the nineteenth century, it was well known for the local population who lived there. They were familiar with the site and its monuments. They feared it, imagined stories, and made parallel histories and even identified themselves with some of its features. But Petra was not only monuments for them. The whole national park was the habitat of several tribes. In it, they lived, used its natural resources, anchored their beliefs, and edified their own history [3].

The Bedouins of Petra—inhabiting the site or around—had found certain equilibrium between their own lifestyle, the archaeological site and the visitors whose number was growing. The modern management of the park, failed to take those realities into account. The first Master Plan ignored local interdependencies

and complementarities [4]. The sole focus was on the development of the site's tourism which many years later had serious impact on the monuments and the natural environment of the Park. The second Master Plan made some efforts to include the local population, but then, when a certain conservation of the Bedouin's presence in the site was proposed (a living museum in one rock-shelter), it was completely ignored again [3].

One of the objectives of the ICOMOS Charter for the Interpretation and Presentation of Cultural Heritage Sites calls for the safeguarding of the tangible and intangible values of cultural heritage sites in their natural and cultural settings and social contexts [5] With Petra being listed as a World Heritage, the oral traditions, myths, stories, and cultural practices of the Bedouins who previously lived in Petra became part of UNESCO's intangible cultural heritage in 2005.⁵ The balance between promoting the socio-economic development of the communities and the preservation of these indigenous values falls among the unmet challenges facing decision-makers that wish to ensure the responsible management of Petra.

7.4 Management Policies and Practices: Impact on Local Community

There have been a number of management structures overseeing the PAP, dating back to the establishment of the Department of Antiquities of Jordan (DOA) in 1923, and the first Law of Antiquities in 1924. As one of the oldest official institutions in Jordan, the DOA was the sole official authority that by law is responsible for all archaeological sites in Jordan, including Petra.

Following the inscription of Petra as a World Heritage site, a number of successive management structures were set up by the government to oversee the Park, covered in detail in chapter two, each with significant repercussions for the local community in terms of use of the land immediately outside the Park boundaries to cultivate crops, herd livestock, invest in infrastructure and tourism services, participate in the tourism industry, political participation, and manage their own development.

7.4.1 Evacuation of Archeological Sites

In 1968, the United States National Parks Service plan for Petra, funded by USAID, called for the evacuation of the Petra cave dwellers, the Bdul tribe, from the archeological site after documenting illicit excavations by the Bdul, illegal sale of old artifacts to tourists, and damage to the caves as a result of fires and erosion [4].

The Bdul, a semi nomadic tribe who traditionally lived in the Nabataeans tombs in the winter and in tents during the warmer months, cultivated cereals, planted trees at Wadi al Siyyagh and herded goats. They are composed of five primary clans: the Al-Faqarah, Al-Jamadah, Muwasah, Samahin, and Al Jdilat; each of which has a sheikh or tribal elder. In 1970, a defense order was issued to evacuate all archeological sites and local committees were formed in the Ma'an district to enforce the decision in Petra. Due to budgetary constraints and lack of political will, no action was taken at that time.

On 26 March 1975, the Jordanian Prime Minister formed a committee that included the Minister of the Interior, the Minister of Finance, the Minister of Tourism, and the Director of the Housing Department. The committee was recommended the relocation of the Bdul following a comprehensive social study by the Department of Housing and delegated the Governor of Ma'an to negotiate with the Bdul [2]. Many meetings followed during which several resettlement proposals were discussed. Among the proposals was resettlement in Al Qarara⁶ area in Wadi Musa. This proposal was rejected by the Bdul because they wanted to remain in close proximity to the archeological site and away from the Layathneh, whom they viewed as a threat to their security and that of their livestock. The Bdul, in return, proposed the area of Stooth Al Nabi Harun, the area extending from the Snake Monument to Jebel Haroun and to Ras Sabra in the south,⁷ which was rejected by the government. As an alternative, the government proposed Um Seyhun, which was initially rejected by the Bdul as the area was considered as the tribal front of the Hasanat tribe, who proceeded to lay claim to the land by planting olive trees. In the end, the Bdul agreed to vacate their caves based on a proposal for self-built stone houses, with walled gardens and space for animals.⁸

Housing development in Um Seyhun was funded by the World Bank under the First Tourism Project. Implementation of the first phase of this project was fraught with difficulty. Based on the recommendations of the Department of Housing survey, 100 housing units were to be constructed. Regrettably, the survey grossly underestimated the numbers of the Bdul, their family sizes, and needs. While there were about 100 households in 1985, the average family size was seven, with the highest population growth rate in the region, estimated at 28% in 1996 [6]. Many Bdul families rejected the relocation proposals outright, as the houses were too small and uncomfortable, and neither pens for sheep and goats nor stables for camels and horses were provided. When they were forced to relocate, the Bdul proceeded to alter the design of the housing projects to include sheep enclosures and additional rooms at their own expense. This resulted in an unplanned and badly executed living environment, which to this day plagues the town.

This living environment is further affected by other conditions imposed by the Bdul.⁹ These included the uprooting of olive trees in the north of the village, allocating two houses to families that exceed six members, giving them agricultural lands to replace those in Petra, and extending the boundaries of the village by one km to the north to accommodate additional houses for Bdul families living in Beidha and Stooth Al Nabi Harun.¹⁰

The First Tourism Project also included other tourism-related infrastructure developments, including a new road between Wadi Musa and Beidha, passing through Um Seyhun, the Forum Hotel (the Crown Plaza now) and a new restaurant inside Petra (Basin Restaurant). The road through Um Seyhun resulted in traffic congestion, compromised the safety of the residents, particularly the children, and created unwanted air and noise pollution further degrading the quality of life for the residents. In more recent years, there have been suggestions to build a ring road around the village to alleviate the environmental impact and ensure safety. The ring road, however, would result in most tourists by-passing Um Seyhun, which would impact on the economic benefits. This is one example where a solution needs to be developed by and with the local community and then proposed to the authorities.

The government agreed to give families over nine persons two houses [six was the number given above], making the 100 units constructed insufficient. On 30 April 1985, only 80 families were moved to Um Seyhun and 52 remained inside Petra and Beidha, awaiting the second phase of the housing development. In 1987, the second phase was finalized and housing units were given to Bdul families. That number remained insufficient having not taken into account an additional 34 families living in Stooth Al Nabi Harun. Those were then granted land by the urban council of Um Seyhun. The nine families excepted from that decision still reside at Stooth Al Nabi Harun, living in caves along with their livestock, and use vehicles to commute to Um Seyhun.

Resettlement of Bdul and Amarin at Um Seyhun and in Beidha housing (Amarin Village) impacted their social life, including access to schools and improved education, better health services through hospitals and clinics, and in their social relations. While previously they led a largely isolated existence living in Petra caves, the resettlement opened them up to other communities. Because the village of Um Seyhun is close to the PAP, the most direct change has come from tourism. Now, more than 12 western women are married to Bdul men and the majority of the youth of this community speak a foreign language fluently. They are familiar with the Petra area, work primarily in vending and donkey-tending, and regularly volunteer in search and rescue operations for visitors in Petra. To create additional employment opportunities and given their knowledge of the area, the Bdul should have been the main recruits to work as rangers in the Park. Currently, out of a total number of 52 some 44 rangers have been trained of whom about 50% is Bdul.

Management decisions, and the process by which they were taken, had repercussions for the local communities. In this case, resettlement impacted the inter-relationships between the tribes, intensifying the rivalry over land between the Hasanat and the Bdul. Antagonism among the tribes also extended to competition over tourism benefits and access to tourism-related services. Tension went beyond inter-tribal relations to include the relationship between the tribes and the central government which became one of constant bargaining, negotiation, and at times strife. The formation of the Petra Development Tourism Regional Authority (PDTRA) as an independent authority and its separation from the Ministry of

Tourism & Antiquities (MOTA) represents an attempt to by authorities to manage this relationship with the local community.

The relocation policies forced changes onto the culture of the tribes, particularly the Bdul, whose lifestyle was altered considerably. The Bdul of Petra has transitioned from Bedouin life to a modern Jordanian village society. They have moved away from farming and herding to tourism-related work. The newer generation of Bdul has given up many traditions, observed most clearly in their dress, food and use of Bedouin language and mother tongue. Most dress in a modern fashion, indistinguishable from youth in other Jordanian cities.

7.4.2 Protection of a World Heritage Site

The inscription of Petra as a UNESCO World Heritage site took place in 1985, and in an effort to protect the site, the Jordanian government in 1993, established the Petra Archeological Park as a protected area. The government confiscated 264 sq km [that is a huge area] from the Layathneh, Bdul, Amarin, and Sa'idiyyine tribes and registered them as park lands. The decision upset these tribes, particularly the Layathneh but the Amarin and the Bdul also on many occasions often protested to the government but failed to get results.

The listing changed the land use practices of the tribes within park boundaries and resulted in further tensions among the tribes and between the tribes and the government. In 1995, for example, acting upon the recommendation of a UNESCO mission, the government decided to limit the length of the horse trails to stop the use of horses in the Petra Siq, all of which were owned by the Layathneh. The Layathneh demanded similar action to be taken against the Bdul-owned donkeys and camels that replaced the horses in the site. With no alternative plan to guarantee income to the Bdul, the government did not take any decision.

In 1994, UNESCO drew up a management plan [2] for the site to address zoning, site use, conservation, local community, and development of the PAP in accordance with the World Heritage Convention and accepted practices for World Heritage sites. The plan proposed the establishment of a buffer zone in government and tribal lands surrounding the Park, with zoning and multiple use restrictions.¹¹ The decision affected local communities living and working in the buffer zone, particularly the Bdul and the Amarin. Due to mounting pressure by these groups, which have traditionally exercised some influence on mandated land use policies, the government disregarded the recommendations and in 2000 transferred all government owned lands in the buffer zone to the local communities of Wadi Musa and Beidha. The decision to placate the traditional owners of these Miri lands was taken at the expense of protecting the Park.

Consequently, lands adjacent to the Park from the east are in private hands. Investors from outside the region, mainly from Amman, bought many of these lands for their economic value and potential tourism development. Land use in this buffer area remains a highly contentious subject and a source of tension between

the local community, investors, and the government. Currently, the property is managed under the law of the PDTRA, the latest governance structure for the region. Pressure is being exerted to allow development under a new master plan.¹² The World Heritage Centre and its Advisory Bodies¹³ expressed concern over new developments and economic and tourist activities. For all practical purposes the buffer zone does not exist to ensure the protection and conservation of World Heritage values.

7.4.3 Political Districting and Representation

The Jordanian Election Law divided Jordan into 12 political districts with three separate constituencies for Bedouin tribes: north Bedouins, middle Bedouins, and south Bedouins. The division created a gap among the Bedouin tribes, particularly in the Petra sub-district by separating the inhabitants of the four villages of Um Seyhun, Beidha, Rajef and Dlagha, listed as south Bedouins, from Wadi Musa and Taybeh. The latter were included in the sub-district of Petra with its own parliamentary seat, and an additional seat for a woman under a mandated quota. This reduced tribal contact between these villages and Wadi Musa and created rivalry among the inhabitants of these villages, on the one hand, and Wadi Musa and Taybeh, on the other.

Throughout the years, management bodies for Petra did not allow for the representation of all towns and villages in the governance structures. Between 1996 and 2007 for example, the council of the Petra Region Authority (PRA) did not include representatives from Um Seyhun or Beidha. This resulted in a show of contempt towards the Wadi Musa community and increased the gap between the inhabitants of Wadi Musa and the other villages.

Rivalry among the tribes forced the government to take action to diffuse the tension. Because interaction among the various tribes was, and remains, governed by tribal norms based on the respect of the rights of every community to the land and the right of one to live on their own land, the government resorted to expanding land use permits to the PAP. In 1993, the Jordanian government allowed the tribes of Wadi Musa, Bdul, and Amarin to use agricultural land located within the existing protected park area, which they had previously exploited. The decision consisted of the following¹⁴:

Allowing the tribes of Wadi Musa to exploit certain lands located in Beidha (Alboma, Faja, Manat Al Theeb, Ras-Slaysel) and cultivating cereals only.

Allowing the Bdul to exploit the lands of Stooth Al Nabi Harun, Tuwiel, Abu-Judel and Tabak Um Sesaban, and cultivating cereals only.

Allowing the Amarin to exploit the Beidha land and to cultivate cereals only.

The Sa'idiyyine were allowed to exploit land in Wadi Araba, Wadi Musa, Taybeh, Alhai, Ain -Amoon, Braq and Rajef, all outside Park boundaries. Land use outside the Park was governed by the regulations and laws of the particular area.

7.5 Commercial Realities and Local Community Relations

The relations between and among the various local communities are complex and are the result of the congruence of social, cultural, historical, geographic, and economic factors. The Bdul and the Amarin enjoy strong ties due to strong social links from geographic proximity, and common experiences, relocation, and relationship to the Park, cemented over the years by inter-marriages. In contrast, the relationship between the Bdul tribe and the people of Wadi Musa are fraught with tensions as a result of land disputes in Um Seyhun and competition over tourism benefits. The Layathneh reject the territorial claim to Petra by the Bdul and describe the Bdul as relatively recent settlers in Petra, who came from Humayma¹⁵ two hundred years ago. The conflict between the two tribes has intensified with the growing of the tourist trade, and has been described by various travelers and scholars over the years. [7–12].

While the overwhelming majority of the Bdul work in the tourism industry, about 30–40% of the inhabitants of Wadi Musa benefit from tourism. While Wadi Musa is more developed as an urban living space and is home to the majority of hotels, restaurants, and other tourism-related services; ownership of these facilities resides with outside investors, Bdul, and residents of Wadi Musa. However, the majority of the residents of Wadi Musa work in government institutions, are enlisted in the army, or employed by private businesses. This has impacted the social fabric of Wadi Musa as many members of the community have moved to Amman or Aqaba to find better job opportunities.

Commercial interests in Petra are monopolized by a few people at the expense of the majority. The total number of people benefiting from the concessions inside Petra is 189, of whom 168 hail from the Bdul and only 21 are from Wadi Musa. There are 31 camels in Petra all owned by the Bdul. On the other hand, horses in Petra number a total of 353, of which 283 are owned by the people of Wadi Musa and 70 are owned by the Bdul. The donkeys in Petra are unlicensed by the government and are totally owned by the Bdul.¹⁶

Economic realities over the last decade dictated increased social interaction between the people of Um Seyhun and their neighboring communities, especially the inhabitants of Wadi Musa. Having been involved most actively in the tourism industry, the people of Um Seyhun have ventured outside their village and Petra to set up private businesses. A successful example is the Ras al-Naqab rest house, which was established by some of the Bdul tribe members through a tourism cooperative in 2008 along the main roadway from Rajef to Aqaba. The project brought increased economic benefits to the cooperative. Other examples include a Bdul-owned restaurant in Wadi Musa catering to tourists as well as a souvenir shop. In response, the people of Wadi Musa have also started to venture beyond their borders and are currently investing in shops in Um Seyhun.

Over the years, while tensions still abound (as evidence by the killing of four residents of Um Seyhun in 2000), with their economic success and resolution of

land conflicts, the people of Um Seyhun are gaining more recognition and acceptance by other tribes in the region. Social occasions are shared among the people of Wadi Musa, Um Seyhun, and the Amarin, and there are a number of marriages between the tribes that took place over the last decade. Today, the three communities, Layathneh, Bdul, and Amarin, are building better relations, and have come to interact more and more as a result of economic ties, brought about by the development of the tourism industry. The Bdul and Amarin visit Wadi Musa regularly to buy their daily needs.

Beyond the three communities, the benefits of the tourism industry remain largely beyond the reach of the other villages in the Petra region. They remain isolated and suffer from high poverty levels, unemployment, and lack of access to basic services.

7.6 Infrastructure Development and Access to Services

Proximity to the PAP has been the critical factor in spurring the development of certain towns and villages. Areas neighboring the Park, particularly Wadi Musa, have seen an increase in social infrastructure, tourism-related service and facilities such as hotels and restaurants, and the presence of administrative and governance bodies.

7.6.1 Infrastructure and Tourist Facilities

As the gateway to the Petra Park, Wadi Musa has developed into the largest urban center in the Petra region and plays a pivotal role in the region's development. It is home to the largest number of tourist facilities as well as services and infrastructure in health, education, and basic services. The PDTRA states that the tourism infrastructure in Wadi Musa is improving, and the benefit to the local community is also increasing. Currently there are 27 restaurants, 39 hotels, of which more than half are owned by the local community of Wadi Musa. In 2011 the number of tourist travel agents in Wadi Musa increased to 27, five of which are owned by the Bdul.¹⁷ In total some 30–40% of the residents of Wadi Musa benefit from tourism.

In 1998, plans for a wastewater treatment plant (WWTP) were drawn. They were designed to handle all wastewater from the four communities adjacent to the PAP, with four pump stations located in Wadi Musa, Taybeh, Beidha, and Um Seyhun. The Wadi Musa Wastewater Re-Use Implementation Project is located in the shallow valley of Sidd al-Ahmar the northernmost end of the PAP. It, and the lands adjacent to it, fall within the boundaries of the protected area. The project comprises the WWTP and 1,069 dunums of farmland intended for the use of treated wastewater for agricultural activities. The land was invested in by the

Society of Sidd al-Ahmar, which comprises Bdul and Amarin farmers as well as farmers from the Wadi Musa Retired Military Association. Since farming has a long history in the region and is an important element of the tribes' livelihoods and cultural heritage, the Sidd al-Ahmar wastewater project has brought much benefit to the community. The land is now being used to harvest wheat, barley, and alfalfa. The crops are used to feed goats and are sold for financial return [13]. On the level of protection of the natural aspect of the Park, agriculture went beyond cereals and animal fodder to planting non- indigenous trees and hot houses were erected for the cultivation of cutting flowers. This was brought to the attention of the Petra authorities on several occasions by both UNESCO and the Petra National Trust (PNT).

7.6.1.1 Health Services

In terms of health services, there is a hospital in Wadi Musa, which is relatively well equipped and well staffed, although the more difficult cases are referred to Amman. In addition there are medical centers in Wadi Musa, and in Taybeh and medical clinics in Beidha, Um Seyhun, Rajef, and Dlagha. The quality of medical services, much like tourism benefits and commercial activity, decreases with distance from the Park.

7.6.2 Education

The educational services appear to be an exception to the above rule. In the more remote communities, there are large public investments in education.

In Wadi Musa, there are 28 public schools, six of which are secondary schools. The total number of students is 4,146 (2,054 males and 2,092 females) students. This is a marked increase from 1996, when there were only 11 public schools enrolling 3,487 students and only two secondary schools [6]. Prior to 1983, there were no secondary schools for girls in Wadi Musa. In Taybeh, on the other hand, the educational facilities include 14 schools, two of which are secondary, whereas the number was seven schools in 1996. At present there are 1,457 students attending school, whereas, the number was 1,299 students in 1996.

In Um Seyhun, there are two primary schools enrolling 520 students (244 boys and 276 girls). In 1996, the total number of students was 303 enrolled in two schools.¹⁸ These children have to commute to Wadi Musa to continue their education in secondary schools, despite the fact that the population of Um Seyhun is equivalent to that of Rajef and Dlagha. In Beidha, there are two primary schools with 85 students and in Rajef there are five schools, two of which are secondary schools. In Dlagha there are three schools, two of which are secondary.

With a long commute to Wadi Musa, only a limited number of students from Um Seyhun and Beidha chose to continue their secondary school education.

According to the Ministry of Education Department in Wadi Musa, there are 40 students from Um Seyhun (20 boys and 20 girls) and 17 from Beidha (11 boys and 6 girls) secondary school in Wadi Musa daily. In 2000, that number was only three, which is indicative of an improvement in educational attainment in these communities. Buses from Wadi Musa travel to Um Seyhun and Beidha twice every morning and once in the afternoon to transport the students back and forth. In an interview with the headmaster of the Wadi Musa secondary school, he predicted that the number of graduates from secondary schools in Wadi Musa will continue to increase.¹⁹

The establishment of the Al-Hussein University in Petra in 1999 improved the level of the education, especially among women, by offering accessible opportunities for higher learning. Prior to 1999, women were unable to attend other Jordanian universities due to expense and distance. Since its establishment the university has dedicated additional seats every year to students from the Ma'an district, which includes Petra, Shobak, and Husseinya, and relaxed entrance requirements to allow students from the district admittance with a 60% pass grade in the high school matriculation (Tawjihi). The University offers two courses at the moment, archeology and hospitality services, but can serve as an ideal location for a future conservation center. According to a 2003 survey conducted by the South Jordan Studies Center at Al Hussein University [14] over 40% of students enrolled that year were from the district, a total number exceeding 1,000 students, of whom 68% is women.

Statistically, however, the total number of students from the Petra region remains rather low. According to a survey conducted by Al Hussein University in 2003 [14], universal education in the Petra region averages a mere 10.2%. The study also found that the highest rates of attrition in the Ma'an district occur in the Petra region, reaching around 3.4%. This, they concluded, is largely due to pressures to participate in the tourism industry. Many young children leave school to work with donkeys, horses, and in souvenirs shops. In contrast, and in terms of electronic literacy, the study found that Wadi Musa registered the highest rates of computer ownership in the Ma'an district. This again is largely due to the interaction with foreign visitors and to meet the needs of the tourism industry which is increasingly becoming electronic based.

In 2010, the PDTRA launched a scholarship program to encourage higher education in the region and to help some of the poor students from the local community who succeed in passing the Tawjihi exam. The PDTRA allocated each of the six communities' two scholarships, as well as six for students whose parents are teachers and two for children of PDTRA employees. Only one Amarin student qualified for the scholarship, while none did from the Bdul. All other communities, Wadi Musa, Taybeh, Rajef, and Dlagha took advantage of the two scholarships. Additionally, the Mus'ab Khorma Youth Empowerment Fund through the nonprofit Arab Foundation for Sustainable Development (Ruwwad), 11 scholarships since 2009 have been offered to students at university level of education against community work in the Ruwwad center in Beidha.

There are three centers for students with special needs, located in Wadi Musa, Taybeh, and Rajef. In Wadi Musa, 70 students from the region are enrolled in grades one through six. In Rajef, the center educates 25 children in grades one through four, and offers handicrafts and souvenir training workshops, whose products are sold to the PDTRA.

While school enrolment and the number of schools have increased over the past 15 years in the Petra region, average school enrolment remains relatively low and attrition rates the highest in the Ma'an district. There are increased investments in educational services, particularly in areas not in physical proximity to the Park, probably as a result of a government decision to reinvest some of the tourism income back in the most needy communities. However, the tourism industry is identified as the main culprit for the low enrolment rates and high attrition rates as children are attracted to the economic benefit from the tourists and leave school to sell souvenirs, work in shops, or tend the animals in the Park.

7.7 Community Practices: Going Full Circle

While some of the activities and lifestyles of the local community have been affected and changed by tourism, local community practices are now impacting tourism and the tourist experience in Petra.

In Petra, practices and activities by the local communities including the building of tourism-related facilities and services and uncontrolled tourism and commercial activity, have had a marked negative impact on the site. Several souvenirs shops, local children selling souvenirs and trinkets throughout the site, restaurants, and events held in sensitive areas, camping, picnicking, filming, and donkey transport are affecting negatively the archeological integrity, cultural heritage, and visitor experience. While all these activities cater to the tourist industry, they detract from the beauty and values of the site and ultimately impact tourism.

These activities constitute a major source of income for the local community and contribute directly to improving the quality of their lives. Any attempt to control or limit such activities is met with resistance by the local community, and in the absence of viable alternatives presents a moral dilemma to decision-makers. Traditionally, management plans for Petra remained largely unimplemented leaving a significant gap in the development of economic opportunities and diverse sources of income for the local communities. Successive management structures and government authorities failed to address this critical need, and coupled with lack of effective local participation in decision-making, have fermented an environment of dissatisfaction and the threat of social unrest.

One example of tourism investment that failed to address the needs of the local community is the Dara Land, an area of 69 dunums originally owned by 284 local citizens. In 1996, under a World Bank funded study by Dar al-Handassah, the Dara area was earmarked to remain a green area, with no development. The zoning was

revised in 1997 after negotiations between the Bank and the Government of Jordan, to allow 25% 'restricted environmentally friendly development' which would include vernacular architecture and one-storey buildings only. The PRA acquired 61 dunums representing 88.4% of the total area through a loan of JD 4.5 million from the Social Security Corporation in 2003 with the stated goal of protecting the area. The remaining lands are privately owned with owners refusing to sell. In negotiations about the use of the land, the Petra National Trust (PNT), a Jordanian non-government organization focusing on heritage preservation, recommended that craft shops and food and beverage outlets be built and rented out to the local owners of the shops in the Park and others from the community. In addition to reducing the pressure that the shop owners pose on the site, the relocation will enhance the visitors experience; provide additional activities for tourists and income opportunities for the local community. Regrettably, these recommendations were sidelined in favor of a high end 'Tourist Village' project that consists of a 100-room hotel, a conference facility, shops, and restaurants. The agreement was signed on 7 September 2009 between the PRA and Pharaon Investment Holdings Limited in the presence of MoTA. The benefit to the local community in this case would be limited to employment in the facility and very minor vending opportunities.

Effective and strong decision-making is needed in Petra. Not only are negative practices impacting the tourist experience, they are also harming local children by encouraging school dropout and preventing children from educational opportunities that help them realize their full potential. The use of natural resources in Petra threatens the integrity of the site. Vendors crush colored sandstone to create souvenirs. Sandstone is chipped off the rock formation and sold to tourists. Unlicensed donkey use also degrades sandstone, and the damage is visible clearly on the steps leading to the Deir. Use of resources also includes natural cover, which is being eroded by grazing of a large number of goats and sheep owned by the people of Um Seyhun and Beidha (which totaled 6,945 goats and 2,669 sheep in 2007).²⁰ The deterioration of vegetation cover by goats in the site is also contributing to rock erosion.

There are damaging tourist practices that are affecting site quality and value and are encouraging local inhabitants to exploit the resources for economic gains, posing a threat to the natural resources. Some of these practices include littering, graffiti, walking on archaeological features, picking up colored stones, pottery shards, and illicit purchasing of ancient archaeological artifacts from local trafficking agents. The resulting visitor experience was described by National Geographic Traveler in 2006 and 2009, which listed Petra as one of the 'Places in the Balance' saying:

An archaeological treasure in great trouble. Its geology, which is part of its attraction, is for sale at every corner. Donkey and horse-carriage owners are aggressive and ask for exorbitant fees. Animal droppings are all around. Another great place that loses because of poor crowd control as well as poor supervision to ensure a quality visit. [15]

7.8 The Local Community Organizes Itself

The earliest forms of social organization in the region were the community centers, most of which focus on volunteer activities to address local community needs, such as skill-building training workshops, services for populations in need. Currently, there are four centers in Beidha, Wadi Musa, Taybeh, and Rajef.

Given the limited participation of the local community in formal decision-making bodies for the region and the failure of the successive management structures to adequately address the need to create additional income opportunities, some community members have responded by creating local non-government organizations (NGOs) that serve to empower and organize the various communities. Many focus on income-generating projects that benefit local residents while producing items for purchase by tourists, others also include political and social empowerment, awareness and site preservation.

The main NGOs that provide assistance to the local communities are:

1. Petra National Trust (PNT), based in Amman with a branch in Wadi Musa. Established in 1988 the Petra National Trust (PNT), is the oldest national NGO working with the local community in the Petra region to improve awareness of the importance of Petra, instil national pride in cultural heritage and advocate for responsible tourism and site preservation. It has implemented numerous projects that focus both on archeology (such as the Siq consolidation project and hydrological system restoration) and community development (including an innovative and acclaimed Junior Ranger Program) and has earned an international reputation for its credibility and reliability.
2. Bait Al-Anbat Society, Wadi Musa. The Bait Al-Anbat Society (House of the Nabataeans), based in Wadi Musa, is a national volunteer institution, established to study and promote historical sites and works through conferences, seminars, workshops, and scientific publications. Bait Al-Anbat's projects include a child protection program to fight against child labor in Petra. It targets children 7–12 years old who drop out of school to work in the tourism industry working to send them back to school. The society also works on textile design for locally manufactured crafts for sale to tourists.
3. Beidha Tourism and Archaeological Cooperative Society (Amarin). This 125-member society represents the Bedouin Amarin tribe that lives near the PAP. It owns and operates a successful Bedouin campsite in a captivating natural setting in the Beidha area. The camp is licensed inside the Park and it is accessed by a road running over antiquities. The camp needs to be relocated, but this decision is yet to be implemented for fear of angering the community. The Amarin village houses approximately 1,000 inhabitants who derive their income mainly from herding and tourism. The cooperative is working with the Ministry of Planning to develop its capacity to produce handicrafts, traditional dolls. It is also working on providing tourists with better access to traditional crafts and information about trails and authentic activities, including a folkloric

group. The project aims to support women-based handicraft income generating activities and preserve local heritage

4. Nabataean Ladies Cooperative of Wadi Musa. This 40-member women's cooperative was established in 1999 and focuses on the production and sale of silver artifacts to wholesalers and tourists in Petra, Amman and the main tourism street. Twenty women from Wadi Musa are employed in the silver workshop. The cooperative's products reflect the rich cultural heritage of the area.
5. Taybeh Women Cooperative, Taybeh. The 50-member Taybeh Women Cooperative was established in 2005 to enhance the quality of life of women and their families in the Petra/Taybeh area through the production of handmade pottery products that resemble ancient Nabataean designs.
6. Um Seyhun Women Tourism Cooperative (al-Khazne). The Um Seyhun Women Tourism Cooperative (al-Khazne) was founded in November 2007. It aims to bring together Bdul women of all ages and educational backgrounds who live in the village. The organization endeavors to create alternative livelihood projects, such as handicraft production, for its 40 members.
7. Um Seyhun Men Tourism Cooperative (al-Khazne) The Um Seyhun Men Tourism Cooperative (al-Khazne) was established in 2007. It seeks to locate alternative sources of income for its community by working closely with the tourism industry.
8. Ruwwad Created in 2005, Ruwwad is the first privately funded NGO in Jordan. It runs a series of programs including scholarships and rehabilitation programs in marginalized communities aimed to make positive meaningful change in the lives of one million people in marginalized and underprivileged societies. It currently provides 11 scholarship opportunities at the university level to the local community in Petra, in exchange for community service.

Other associations include:

Al Anbat Ladies Association
 Petra Local Tour Guides Cooperative Society
 Al Rawahel Owners Association (Horse Owners Society)
 Wadi Musa Society
 Al Bint Castle Tourism Association
 Al Deba'a Ladies Association
 General Eastern Antiques Tourism Association
 Military Retirees Association
 Palestine Association
 Petra Gate Tourism Association
 Petra Hotel Association
 Voice Of Peace Cooperative Association

Over the past years, several foreign governments, aid agencies, and multilateral and international organizations have participated with the Jordanian government in developing management plans for Petra. For the main part, these plans have focused

on economic development tourism services and the protection and preservation of the sites. In many cases, the needs of the local community were addressed only to meet the touristic or preservation objectives for the site. This disenfranchisement contributed to the community feeling isolated from the decision-makers and sowed the seeds for the social unrest witnessed in recent years. The local non-governmental community has been the first to respond to this gap in planning and begin to address more directly the social, economic, and cultural needs of the Petra communities. International organizations followed, and we now witness more concerted efforts to target community members and create more tangible income generating opportunities. The USAID/Jordan Tourism Development Project, for example, is working with several of these NGOs to benefit local communities through the design and production of varied handicrafts inspired by Petra and to improve sales and marketing to increase income and improve the sustainability of the projects. It aims to raise the workforce from 28,000 in 2005 to 62,500 in 2012.

7.9 Conclusion

The local community in Petra has been affected by and in turn has impacted the tourism industry in the region. Petra represents the primary source of income and livelihood for the communities of the region. Economic opportunities, however, are not distributed equally among the various communities as a result of geographical and social factors as well as dysfunctional management and decision-making processes. This inequitable distribution of tourism benefits has caused and intensified conflict among some of these communities. It has also resulted in poverty, social challenges, including low educational levels, and behavior that places duress on the archeological sites, despite the increase in the number of visitors and associated financial benefits. This in turn impacted the tourist experience in Petra, threatening the site's position as a premier tourist destination.

One important case study is the resettlement of the Bdul and Amarin at Um Seyhun and Beidha, which should serve as a reference when looking at communities in other World Heritage sites. There are many lessons to be learned about the resettlement of traditional communities and its impact land use and ownership, cultural lifestyles, and traditional knowledge and skills, and the need to plan for diverse, sustainable and responsible income generating opportunities. Failure to do so has resulted, in the case of the Bdul for example, in a badly executed, unhealthy and unproductive living environment, the erosion of traditional values and cultural heritage, and social discontent.

Community organizations tell a more positive story. Through self-organization, in partnership with national and international bodies, the needs of the local community are better addressed. A plethora of NGOs in Petra need to find diverse sources of income and deserve a place at the table of decision-making. All of this depends upon respect for the culture and values of the local community.

Endnotes

1. Ministry of Tourism and Antiquities statistics: in 1985, there were 93,933 visitors to Petra, in 1995, the number increased to 337,221, in 2000 it reached 481,198, in 2007, 577,860, in 2008 that number jumped to 853,272, and today it stands at 975,285 visitors.
2. Department of Civil Status statistics.
3. http://www.unesco.org/culture/intangible-heritage/20arb_uk.htm
4. http://www.unesco.org/culture/intangible-heritage/20arb_uk.htm
5. UNESCO WHC 2010.
6. Locate to the north of Wadi Musa and overlooking the Crown Plaza Hotel. The Land was in that time the tribal fronts of Helalat tribe.
7. The area is within the boundary of the Park.
8. Plan prepared by UNESCO consultant Abed al-Wahed al-Wakil.
9. Meeting at the office of the Governor of Ma'an, 25 July 1984, attended Bdul representatives, Governor of Ma'an, Governor of Wadi Musa, director of the First Tourism Project and the Inspector of Antiquities.
10. The details of concessions to the Bdul in the 1993 Decree are described p6.
11. See Section 2: Site Management, History and Status.
12. This Master Plan has not been officially handed to PTDRA yet.
13. The Advisory Bodies to the World Heritage Committee. It is comprised of the International Council on Monuments and Sites (ICOMOS) and the World Conservation Union (IUCN), which respectively advise the World Heritage Committee on cultural sites and natural sites, and the International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM), which provides the Committee with expert advice on conservation of cultural sites and on training activities.
14. According to the Jordanian Official Gazette (1994).
15. Humayma is a small town below Ras al Naqab in Aqaba region. Some of the Bdul tribe members at Umm Seyhun still have lands and relatives their.
16. Source Petra Archeological Park, June 2011.
17. According to PTDRA in June 2011.
18. Dar al Handasa projected the number would be increased in 2011 to 567
19. The name of the head master is Usif Nawafleh. According to a telephone call on 21 June 2011.
20. According to Petra Agricultural Office, 2008.

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Author Biography

Dr. Suleiman Ali Al Farajat is an accomplished archaeologist, conservator, site manager, and community leader. For over 28 years he has worked for the development and protection of antiquities in Jordan, with a focus on Petra. He was the first Director of the Petra Archaeological Park, formed to protect the Petra World Heritage Site. In this capacity he often showcased Petra to heads of state and other dignitaries. Throughout his career he has served as a spokesperson and fundraiser for Petra, working to forge stronger relations with national and foreign entities. He has been a facilitator and bridge between local communities and the public and private sector organizations working in Petra, engaging these groups in collaborative work and decision making. His first priority has been promoting awareness of the dual importance of conservation and sustainable tourism in Petra, at the domestic and international level. At present he mentors future leaders in the fields of archaeology, tourism, and conservation.

Part IV
Summary and Conclusions

Chapter 8

The Tourism Juggernaut: A Retrospective on Profit and Preservation at Petra

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In eighteenth century Colonial India, the English watched in confusion as processions of enormous wagons rolled by on solid wheels 40 feet high, bearing images of Krishna (in Sanskrit, *Jagannatha*). Bound for the temple of Jagannath at Puri, they were pulled by 4,000 adherents, many of whom were crushed by the carts. Some interpreted what they saw as self-sacrifice, but in fact those who met death in this awful way were victims of the enthusiastic press of the crowd and the unwieldy nature of the wagon. The juggernaut vehicle was flimsy; laden with heavy iconic images it was impossible to control. It veered this way and that, unstoppable, destroying the believers crowded around it.

In his watershed work, *The Consequences of Modernity* [1], sociologist and philosopher Anthony Giddens compares the course of modernity with that of the juggernaut, seeing each as erratic, destructive, and unsustainable unless structural weaknesses are acknowledged and corrected. Tourism as a vehicle for economic improvement in many ways resembles the metaphorical juggernaut Giddens describes. There are few effective standards or mechanisms in place to control this economic vehicle, particularly in developing countries. While little protects the workers in the industry, almost nothing protects natural and cultural resources that are held out as tourism attractions.

Tourism is now one of the largest sectors in the global economy, and enjoys the approbation of most, from travel writers such as Paul Theroux [2] and Pico Iyer [3], who compare tourism favorably to pilgrimages, to anthropologists, usually noted for somewhat more critical appraisals if not downright skepticism. The most recent issue of the American Anthropological Association newsletter, the *Anthropology News*, is devoted to tourism. While note is taken of the facts that jobs created by tourism are notoriously ill-paid and do not prepare those employed for work in other sectors, the overall tone of the issue and most of the articles are very positive.

The very real possibilities that tourism offers for intercultural understanding, providing an economic base from which to build programs and establish policies

that improve the human condition (e.g., health care, education, women's rights), nurturing an enlightened and useful understanding of the past and the workings of the natural world, and even in preserving archaeological sites remain all too often possibilities. Enthusiasm for these possibilities has overwhelmed reality.

Like the juggernaut, overblown scale in tourism is problematic. Preservation of vulnerable and irreplaceable archaeological resources requires a responsive and nimble management that is committed to and focused on this goal. Instead, around the world we see an overwhelming emphasis on rapid enhancement of tourism revenues through massive construction projects as well as huge loans and grants from bureaucratic banks and government organizations. The great bulk of these monies find their way to corporations selected to implement development largely on the criterion of demonstrated capacity to administer large development contracts in ways that comply with arcane and often ineffective accounting procedures. Such companies are single-mindedly focused on numbers of tourists, paying only lip service to preservation. Beneficiary countries are left reeling from the onslaught of tourists with no effective way to deal with it. Ironically, the vague, meaningless, and crude metrics used to evaluate the success of such massive development assistance efforts blinds all interested parties to the ways in which greater revenue could be realized from tourism through preserving archaeological resources. Even the simple device of limiting numbers of tourists and effectively managing those admitted to archaeologically sensitive areas while interpreting what has been or will be seen elsewhere is overlooked.

Problems with scale are everywhere one looks. Mass tourism quickly puts local businesses at a disadvantage. Local small businesses find it difficult if not impossible to compete with international hotel and restaurant chains, travel companies, and transportation companies. Large companies can deploy tested formulas for the nuts and bolts of business management: accounting, advertising, maintenance, staffing, and training. In the business of mass tourism, three sizes fit all: budget, moderate, and luxury. Despite superficial trappings of decor and cuisine, the experience provided by chain hotels, restaurants, transportation, and tours largely insulates travelers from the culture that surrounds the bubble constructed around them. Corporate strategy dictates a constant increase in profits, often realized by buying up smaller competitors and developing business alliances that result in something approaching vertical integration.

As Hal Rothman [4] has pointed out, cultural and heritage tourism in the American West was transformed first into recreational tourism and then to entertainment tourism as efforts were made to attract more and more people. The culmination of this process can be seen in Las Vegas and in the numerous smaller versions of it in the American West. In doing so, the "product" provided by tourism became homogenized and predictable in an effort to please the greatest numbers of people. When the marketing target is a large and broad one, predictability is seen as an essential aspect of "branding," whether the product is an experience provided at a tourism destination, orange juice sold in a grocery store, or hamburgers at a chain of fast food restaurants. Authenticity is replaced by "constructed" or "bottled" authenticity. Thus, in the middle of the Nevada desert

town of Las Vegas, one can visit a miniature New York and an Egyptian pyramid that projects a laser through a transparent capstone which is visible from space. Before the global economic woes of 2008, young people in Las Vegas were eschewing college education in order to take lucrative jobs immediately after high school as dealers and other workers in gambling casinos and in the construction industry that was feverishly building new hotels and casinos. This of course has not prepared them to take new jobs elsewhere now that the entertainment and construction industries in Nevada have fallen on hard times. Perhaps with the relegation of tourism workers to positions that offer limited opportunities for advancement and the way that employment in service and trade jobs depends upon rapid and unpredictable economic fluctuations in mind, Rothman considers tourism as “the most colonial of colonial economies” (1998: 11).

In the absence of intervention, the small-scale tourism initially associated with cultural attractions evolves into recreational and entertainment tourism, which attracts many more people. The transition to mass tourism is accelerated by loans and grants that are intended to increase the number of tourists. Masses of people streaming almost at will through an archaeological site are destructive in the same way that crowds would be if they were permitted to pass through a museum in which artifacts were displayed without cases or guards. The former is unthinkable; the latter is allowed and encouraged at Petra and other premier archaeological sites.

8.1 Part of the Problem

International assistance provided through loans or grants for tourism development are a large part of the problem. The prime objective of such organizations is to enhance the flow of capital or growth of capital. While this might seem laudable, both banks and aid organizations have been widely criticized for facilitating financial gain to individuals, groups, and companies already wealthy, leaving entrepreneurs in local communities at a very strong disadvantage. The social fabric of communities is damaged in this way. First expectations are raised unrealistically, and then local businesses find that they can only realistically compete with one another, having no way to provide the predictable, homogenized products and experiences offered by international corporations.

The preservation of cultural resources and conservation of natural resources is clearly not the primary objective of the development projects that are financed by such organizations. Resource concerns are addressed in policy documents that do not form the basis for effective protocols for the protection of resources. Here, too, the problem is related to scale. While World Bank policies require an environmental assessment, this is done for entire projects, which are almost always massive. The effect of each component of the project is ignored or left to deal with by the country to which a loan is made. If the country is a developing one, it will almost invariably not have the resources to conduct an environmental assessment, or to do an effective one.

Because of scale, USAID is effectively unable to utilize the expertise of qualified, concerned, and independent archaeologists and scientists in related fields. The scale of projects that trigger concern for archaeological resources or that have as their objective to increase tourism to archaeological sites dictates that archaeologists and other scientists involved in development projects must be employed or work as subcontractors to the large corporations colloquially known as “beltway bandits.” These corporations have established the large and necessarily bureaucratic administrative structure required to deal with the even larger and more bureaucratic administrative infrastructures of government agencies and large banks. The name, “beltway bandit,” is a reference to firms that have established offices within or near the highway that circles around Washington, DC, known as the beltway. Such organizations can actually be located anywhere, and would qualify as such as long as they specialize in acquiring and executing large contracts, especially development contracts, according to the voluminous, sometimes vague, and occasionally contradictory regulations for contracting established by the government.

It works in favor of large corporations that USAID and other foreign aid organizations find it much more convenient to establish a few very large contracts as opposed to many small ones, because to establish each contract requires a lengthy and costly process.

Inertia and lack of effective oversight is usually enough to prevent outright dissolution of a government or financial bureaucracy no matter how ineffective it might be. The bureaucratic equivalent of dissolution is reorganization, which occurs when international development bureaucrats must defend themselves against periodic accusations of cost inefficiencies and failure to produce favorable outcomes. Following reorganization, they typically adhere ever more closely to contracting regulations in an effort to demonstrate that they can at least account for contracted funds. This provides even greater motivation to contract with large firms, which typically employ a number of people experienced in the arcane accounting protocols employed by bureaucratic banks and government agencies: the voluminous and sometimes contradictory contracting regulations that have grown like Topsy over the decades, and expensive accounting systems, impenetrable to most and therefore not amenable to oversight by underpaid government auditors.

Input provided by archaeologists and other scientists and preservationists who agree to work for such companies are as a matter of course ignored or overruled by those managing assistance projects. Whatever documents are produced through funding to large corporations are in the end the product of those corporations, and not those who assisted in their preparation, or even those who prepared them. The author and others of his acquaintance have submitted material under subcontract to such corporations only to find it deleted or altered, or to find additional material in the final report that is not compatible to what was recommended. Those who work for the company are compelled to have as their first objective the accomplishment of corporate goals. The first goal of any corporation must be to make money. Executives are evaluated by corporate boards on whether or not they have

increased corporate profits. Corporations are in competition with other corporations, and can be squeezed out of industry sectors if they do not produce sufficient profits.

In such an environment, concerns about cultural and natural resources are suppressed. Corporate executives tend to be rational people, if not usually sensitive to or even aware of preservation issues. Rationally, one does not raise concerns that might in the end suggest the desirability of reducing numbers of tourists when one has a contract to increase tourism. Moreover, one does not take any action or introduce any subject that might overly alarm the client, which in the end, regardless of whether funds are transferred by grants or loans, is the government of the developing country. Governments can be hesitant to implement recommended change that might displace or threaten individuals, groups, or organizations that are politically or socially important to the government, that might alter the distribution of economic and social benefit in ways that displease the powerful and influential in the recipient country, or that might run counter to a pet project of the government. The transparency and accountability that are held up as the ideals of good governance have sometimes not fully emerged in developing countries. Corporations contracted to develop tourism in developing countries are motivated by profit motive, and cannot be expected to threaten profits by pressing for change.

8.2 Defining Outcomes

For the most part, the desired outcomes that are identified by large banks and aid organizations comprise a litany of the defensive terms that are deployed, and in some cases coined, by those intent on rapid development at any cost: poverty reduction, capacity building, infrastructure development. Yet metrics for evaluating how well such noble goals have been accomplished are generally not provided, or if provided they are not actually relevant to those goals. In many cases, too, the instruments used to measure outcomes are of questionable reliability.

In regard to the tourism industry, few metrics can be seen by all as being reliable. Among those deemed most reliable are the number of visitors to a place, although statistics here can be documented poorly or misrepresented. Determining just how much economic benefit has been realized is much more difficult. It is also more subject to debate. Surely, there is an economic phenomenon that corresponds roughly to the “multiplier effect” so often cited by enthusiasts of the tourism industry. Yet how this should be calculated is problematic. If a tourist stays overnight in a town adjacent to Petra, for example, how much will that tourist spend and who will benefit from the expenditure? There are a multitude of factors affecting this: does this person stay in a five-star hotel or rent a room in a home in Um Sayoun? Does he or she go to dinner, and where? Does this person buy items for themselves or gifts for others? Where do the profits from these transactions go? Do local vendors reinvest profits to improve or expand services, do they distribute them to family members, are they recycled in local communities, or do they spend

them on entertainment in Aqaba or Sharm el Shiek? Do the profits go to multinational corporations to enrich stockholders, board members, and local associates? Are they used by multinational corporations to build hotels and restaurants in emerging tourist destinations far away from Jordan?

8.3 Tourism at any Cost

The focus on the number of tourists and reported tourism revenues is clear in Jordan. A 2003 report prepared under contract for the US Agency for International Development (USAID) was entitled, “A Strategic Approach to Doubling the Tourism Economy of Jordan, 2004–2010.” The report suggests that the tourism economy of 2003, which was given as 500 million Jordanian Dinar per year, should grow to 1,100 million Jordanian Dinar by 2010. In fact, tourism revenues in 2010 were 2,423 million Jordanian Dinar. Put in another way, this was 2.432 billion Jordanian Dinar. This was, then, twice as much as the target set in 2003. The tourism strategy has by such calculations been an enormous success. But because these great numbers of tourists were directed into archaeological sites for which adequate management had not been put into place, as the preceding chapters in this publication establish, the archaeological heritage at Petra has been greatly damaged.

The 2003 plan provides a list of “pull factors”: The Dead Sea, ties to The Holy Land, Petra, and Wadi Rum. Holy Land sites are archaeological sites, fragile archaeological resources are found at Wadi Rum, and the pace of development around the Dead Sea has undoubtedly destroyed archaeological resources there. Ironically, while international banks and aid organizations provide many millions of dollars each year to entice more people to visit archaeological sites in Jordan, funding for archaeological research is extraordinarily meager. For example, funding for archaeological research to mitigate the destruction of archaeological resources in the approximately 7 km path of a water line constructed between Wadi Musa and the Beidha area a few years ago was on the order of a few thousand Jordanian Dinars. This level of funding was not sufficient to carry out archaeological excavations to accepted professional standards in an area that surely contains one of the densest concentrations of important archaeological material in the world.

According to the 2003 USAID [5] report, “Iconic heritage and landscapes have a unique role as keystone building blocks of quality visitor experiences and powerful motivators supporting tourism marketing success.” That tourism, not preservation, is the preeminent concern is quite clearly articulated:

Jordan’s policy of combining tourism and antiquities, and now crafts into a single Ministry is widely admired internationally. In other countries divergence between these groups can create major access and operational difficulties for tourism industries with a heavy reliance on heritage.

8.4 The Future of Non-Renewable Resources

The position taken here is a simple one: The material from which Petra was formed at different times in the past can provide information about the humans and human groups that gave it form and assigned it meaning; moreover, much of this information can be obtained in no other way. Damaging or destroying this material will therefore result in an irretrievable loss of information. As has been said elsewhere, archaeological material provides evidence that if properly documented and analyzed can provide a different and sometimes essential perspective from which to enhance our understanding of human events. Every detectives know this, and so does every scientist concerned with human behavior or how the natural world impinges upon human interests, not just archaeologists, but also geologists, epidemiologists, cartographers, art historians, and many more. From these fields and scientific fields yet to be established will come tools and approaches in the future that will tell us more than we can know using the tools and approaches that we have at our disposal today. Therefore, our first and essential priority must be the preservation of this material.

This type of thinking, thinking in the very long term, is not frequently deployed in the course of an average human day. Humans tend to be temporal chauvinists, focused on immediate concerns, using all our resources to rise to the challenges of near term, which are very real and often urgent. This can be expected to crowd out our concern for the future and what we can learn from the past to prepare for that future.

8.5 Our Pivotal Generation

The demographer Carl Haub [6], in a widely cited article, estimated in 2002 that the current world population represented about 5.8% of those who have ever lived. Population is rising extremely rapidly. According to the United Nations Department of Economic and Social Affairs [7] in 2003, world population in 2300 was projected to range from 9 to 37 billion. Other estimates generally fall within this range. By 2300, then, the generation alive today will represent a very small percentage of those who have ever lived, perhaps as small as 3 or 4%, and almost surely no more than now. If time were the hourglass by which it is sometimes represented, our generation would be passing through the small neck that separates top from bottom. Below would be all of the people who have lived before, above, all who will come. The collective experience and history of the approximately 95% of people who have ever lived is largely unwritten. Much of that has profoundly shaped what we are today, both physically and culturally.

Therefore, our generation is a pivotal one. The rate of obliteration associated with development and industrialization has increased drastically during the our lifetimes. As one measure of this, more than half of all the energy produced since the Industrial Revolution has been consumed during the last two decades, despite

major advances in energy efficiency implemented by almost all energy consuming industries. Vitousek, et al. [8], reported in a 1997 *Science* article that between one-third and one-half of the land surface of the earth had been transformed by humans. One can reasonably expect that archaeological resources not destroyed by this alteration have at least been discovered. Once discovered, in the absence of protection, sites will ultimately be looted, a process that will almost surely grow apace with population increase and increasing access to remote areas of the world.

The trajectory of development, industrialization, and energy consumption can only be expected to increase as countries such as China, India, and Brazil take great strides toward development equity with the US and western Europe. As this occurs, we will see increased consumption of energy, of metals, and a wide variety of minerals required by industrial and industrializing nations; vastly greater areas of land put into agricultural use in order to feed increasing populations (which often develop strong preferences for meat as opposed to directly consuming grains and vegetables, thereby prompting cultivation of ever more grain over larger areas to feed herd animals); the building of more roads and more and larger houses, offices, restaurants, hotels, and stores; and the heating and cooling of such places to the standards expected by populations in the industrialized world.

The implications for countries in which effective administrative infrastructures are not present or are not well developed are especially dire. Huge swaths of land in Africa and in what were once far-flung regions of Asia and South America are now given over to mining, oil exploration and transport, manufacturing, and attendant development by multinational companies and financial organizations with little thought to conservation of natural resources or preservation of cultural ones.

Against the runaway obliteration of our archaeological heritage there are precious few defenses except the World Heritage Convention. The World Heritage List can play an important role in implementing the Convention if it protects places especially important to our common human history and if it provides models of excellence in the management of archaeological heritage. This can only be done if preservation is the first priority. The onus must be on tourism to establish that it can contribute to preservation and not threaten it before it is permitted at World Heritage sites.

8.6 Resistance

Most of us who are deeply enmeshed in the modern world would probably find it difficult to imagine living in a society that is not organized around jobs and wages. Because of this, resistance to modernity seems irrational. We focus on what we see as the freedom to chart our own destinies, which to a large degree is simply liberation from traditional familial obligations that are often enforced by unequal power relationships: old dominating the young, men dominating women.

This is so even though in the United States it is not uncommon for politicians to stress the importance of the family. Many on the conservative side of the political

spectrum there proclaim at every opportunity that the family is paramount and should be regarded as sacrosanct. In Jordan, the paramount position of the family is more than a rhetorical device, it is reality. Loyalty to family and tribe come before all else among a substantial percentage of the population. Kin-based loyalty presents well known and frequently discussed problems to those who would modernize the management of Petra: people do not readily leave Amman because their family has moved there to partake of new opportunities, and therefore keeping qualified staff at Petra is highly problematic. Positions are filled in less than transparent ways, and whether or not those selecting for vacant positions are swayed by preference for family members, almost everyone aware of the process assumes this to be the case. Vendors occupying prime locations within the core area of the ancient city of Petra are found to be associated with a group that includes influential people. All of this and more is decried as corruption, yet nothing changes even when such matters become public knowledge.

Many anthropologists would contend that this constitutes not corruption, but resistance to the imposition of a new order on the traditional cultures of the area. (See, for example, “We Eat the Mines and the Mines Eat Us,” [9]; “Spirits of Resistance and Capitalist Discipline,” [10]. What the West calls modernization disrupts traditional relationships that impart meaning to the lives of people living in pre-capitalist ways. And, it is not lost on such peoples that the institutions that promote change are often setting the stage for dominance of the local economy by international corporations. Clear to all, too, is that the manner in which large corporations operate can also be seen as corrupt. They exploit networks of relationships that are formed to increase profit for members and with little regard for the long-term wellbeing of local communities. Corporations make business arrangements among themselves, effectively developing a way to vertically integrate tourism from transportation through lodging, providing food and drink, offering souvenirs and handcrafts, and guiding. While a few cosmopolitan citizens of Amman might enjoy some economic benefit from this system, locals are transformed from members of a human community to employees. In fact, many in what we would call the “traditional” cultures of Jordan regard employment in the tourism as less than fully honorable. While this might seem backward to the managers and board members who operate large hotel and restaurant chains, there was widespread resistance to what was regarded as “wage slavery” among agriculturally based populations in Europe and the United States during the transition to industry in the eighteenth and nineteenth centuries.

If we truly want to understand why, for example, an estimated 25,000 jobs in the hospitality industry in Jordan remain vacant, we might begin by recalling that the fully capitalist organization of society is very new. It dates only to the Industrial Revolution, perhaps more specifically to the second half of the eighteenth century, in which it rapidly emerged in spite of resistance from the great majority of the population, as well as from intellectuals. Perhaps the most famous example of this is the statement by Friedrich Engels written in 1847 in what he regarded as a statement of the principals of communism [11].

The slave is sold once and for all; the proletarian must sell himself daily and hourly. The individual slave, property of one master, is assured an existence, however miserable it may be, because of the master's interest. The individual proletarian, property as it were of the entire bourgeois class which buys his labor only when someone has need of it, has no secure existence.

Experience since then suggests that when an economy is strong and is, first of all, regulated in ways that prevent industrial monopolization, and, secondly, societies establish institutions that provide nurture and support once provided by families (e.g., care and education of the young, care for the aged and infirm, a sense of community, an identity based in acknowledged contributions to group welfare), great improvements are made to the quality of human life. Unfortunately, these conditions do not always obtain. Even in places and times when capitalism has been well established, economic cycles have thrown societies in chaos, as was the case in the Great Depression. The fact that the transition to full capitalism introduces such uncertainty is not lost on people in what we in the West regard as developing countries. Surely there is an understanding that the transition to modernity is probably irreversible. The transition involves profound realignment of roles and sources of emotional satisfaction, and puts one at the mercy of non-kin based organizations that have as their only objective the generation of profit.

Leaving aside a discussion about how desirable these cultural attitudes might be, one can surely recognize that they exist and that they exert an enormous influence on efforts to build "modern" management at Petra. Also, considering the turmoil associated with such cultural change in all places and times, one is inclined to think that these attitudes will not change quickly or easily. With that in mind, it would be prudent to give thought to the scale of tourism that can be accommodated without harm to resources until, and if, these cultural changes occur.

8.7 The Result of the Tourism Juggernaut

In previous chapters we have reported on what this overwhelming focus on increasing the number of tourists and thus tourism revenues has produced. One effect has been institutional. As Aysar Akrawi has reported, management of the Petra archaeological site has gone through many iterations. Given the exponential increase in the number of tourists, even countries with well developed systems of managing national parks or historic sites would be hard pressed to respond in a fully acceptable way. Jordan, in contrast, had not had the time nor the resources with which to develop such an organization, which until the recent arrival of tourism as a desired economic pillar was seen as a luxury. The focus of the Department of Antiquities since its inception under British rule in 1937 has been research. And, in any case, the role of the Department of Antiquities in the management of Petra has been minimized, if not completely eliminated.

While a master plan for Petra was prepared in 1968 by experts from the United States National Park Service that recommended establishing a Petra Archaeological Park, the structure of the Jordanian government at that time was such that this could not be easily done. Absent from the umbrella of National Park status, management functions such as maintenance, law enforcement, interpretation, visitor safety, visitor services, administration, and conservation were conducted by different governmental units located in Amman or Wadi Musa. Therefore, there was no integrated management of Petra whatsoever when the site was admitted to the World Heritage List.

As Akrawi further notes, integrated management has ever since remained an elusive goal. Under all management organizations, protection of antiquities was seen as a function of the Department of Antiquities, while the operation of the visitor center and tours was under the administration of the Ministry of Tourism. This being so, tourists were not instructed in the kinds of behavior that would damage the site, such as sitting on ancient walls, entering tombs, buying antiquities, and abrading sandstone surfaces.

8.8 Damage to Monuments Produced by Visitors

Had such instructions been given to visitors, and more generally had the activities of tourists been effectively managed, much of the damage that Paradise describes (at least that which is not attributable to flooding) could have been prevented. For years, however, such instructions were not formulated, much less propagated to tourists. Despite many years of published research on the destructive effects of unregulated visitor behavior and the stories that circulated freely among all concerned parties that described damage to tombs, friezes, and standing structures resulting from the staging of special events among the antiquities, such behavior was never forbidden. Why this was not done might never be fully understood. It seems very likely, though, that the lack of concern for the real and visible degradation of irreplaceable archaeological resources was related to the emphasis on promoting tourism and the positioning of those responsible for the preservation of antiquities within a ministry of both tourism and antiquities. It is probably significant that while the Department of Antiquities was, according to Akrawi, “an independent administrative and financial body” for decades, it was placed in the newly formed Ministry of Tourism and Antiquities in 1988, 3 years after Petra became listed as World Heritage. What has become clear is that “sustainability” has different meanings for different parties. From a tourism standpoint, ancient broken steps can be repaired. From an archaeological standpoint, the information that might have been realized from a study of those ancient steps is forever lost (see Vending to Tourists, below). While many had hoped that the marriage between tourism and the preservation of antiquities might be a workable one, time has proven that this is unlikely and probably impossible, and unimaginable if tourism plays the dominant role in the partnership.

8.9 Experimentation with and Resulting Damage to Nonrenewable Resources

Paradise also notes that, “Although current research in stone conservation focuses on the use of consolidates in strengthening stone integrity and fabric, the removal of salt efflorescence, plants, and lichens (in most cases) alone can decrease the rate of erosion and weathering. These simple procedures have proven effective in the past.” The use of consolidants has, as Paradise says, met with very mixed results. Where they have been used on plaster, they have at least sometimes been successful on stone, though, consolidants used in the last 30 years have discolored. Stone experts, intent on their research, have sometimes not been mindful of the effect that the research itself can have on resources. While consolidants were very probably used by the Nabataeans themselves, according to Paradise, these consolidants are now part of the archaeological record, and as such are deserving of preservation, not to be compromised by modern treatments unless absolutely necessary.

Insensitivity to the nonrenewable character of cultural resources on the part of those experimenting with stone preservation treatments is evident. One can see drill holes where stone samples have been taken along a frequently used pathway. Even worse, only recently the facade of the Tukmaniyya tomb was used as a test location for a compound that was to remove salts from stone. This compound was applied as a layer that was to stay in place for some time. A portion of the layer came off or was removed prematurely, so that the surface of the facade came off with it (See photos of the results of improper treatments in [Chap. 3](#)). It is a matter of dark irony that the company that conducted the experiment is from a country in which experimentation with such a visible and important monument would probably not be permitted. Effective management of such intrusive experimental activities has yet to be put in place at Petra, in much the same way that capacity for the regulation of the flow of tourists has not been established. As yet another example of this, scaffolding at one of the most visible of the Petra tombs remains in place even today, many years after experimentation/treatment at that tomb has been completed. This is so even though the scaffolding presents a real danger to tourists, some of whom climb on it to inspect and touch the tomb facade in the absence of effective surveillance and regulation of visitor behavior. There has, in fact, been a persistent rumor that a tourist fell and was killed from this scaffolding. Although this rumor is widespread, and the potential for just such an accident is obvious, the scaffolding remains, itself something of a monument to the lack of effective and integrated site management at Petra.

8.10 Damage to Subsurface Archaeological Remains

As described elsewhere, water damage to monuments has been substantial, and it has increased as impervious surfaces have been introduced upslope from the core area of Petra antiquities. The author has many times witnessed damage to

subsurface remains from flooding. Precipitation at Petra occurs often in rain events that can deliver a significant percentage of the total yearly rainfall (sometimes half or more) in a day or a few days. Torrents of water quickly form ravines. Within a day or a few days, they are filled in with the use of heavy equipment. Were they not filled in, they would impede the progress of tourists through the heart of the site. This cosmetic repair does not, of course, mitigate the loss of archaeological context for any materials that might have been exposed in the ravines, which can be two and more meters deep.

8.11 Vending to Tourists

8.11.1 Looting

Sales to tourists of what are represented to be coins, potsherds, and lamps are common at Petra, especially when tourists take paths that lead them away from the most heavily visited areas. While there is a cottage industry in the production of fake antiquities, there is also an industry in the sale of authentic ones to discerning buyers who recognize the forged antiquities for what they are. Arrangements for the sale of real antiquities to interested parties who have refused to purchase replicas that have been treated in ways that simulate the patina of age are most easily made out of view of Petra Archaeological Park employees and other visitors. The backcountry trails are ideal venues for this, and so encouraging visitors to take these trails has encouraged looting at Petra.

As Angel has pointed out, the B'dul Bedouin have gradually become more dependent upon a tourism economy since at least the 1920s, when the Cook company began bringing people to camp within the core area of Petra. In those days, and until the removal of the B'dul from their occupation of the tombs in Petra to the town constructed for them in the 1980s, Um Sayhoun, they interacted with tourists on a daily basis as guides, cooks, and in other ways, which also provided them opportunities to vend items of interest to tourists. While the town of Wadi Musa serves as the gateway community for Petra, the connection between Petra and Um Sayhoun is only by the Turkmaniyya Road. Tourists are forbidden to use this road, which thereby greatly reduces opportunities for vending to tourists by the B'dul. There are excellent reasons for denying the use of this road to tourists. The narrow road occupies a steep grade and wends its way through important tombs and other archaeological sites. Widening the road to accommodate tour buses would damage both these resources and the aesthetic appearance of the landscape. The use of even small vehicles has proven impractical, as electric vehicles do not operate well in the extreme heat of the summer, and all vehicles powered by environmentally friendly means are unable to negotiate the grade. Finally, given the very limited capacity for managing the site of Petra that has been demonstrated so far, it is

likely that such a road would spark all manner of undesirable development. The B'dul, then, must largely depend upon vending on the site itself to generate income. They are acutely aware that even then they do not have the economic opportunities available to the occupants of Wadi Musa. They are not to build hotels and restaurants, as is done in Wadi Musa, because there are limits on the number and height of structures in Um Sayhoun, some of which can already be seen from the ancient core of Petra. Because of this, the motivation and rationale to vend antiquities are strong.

8.11.2 Damage to Archeological Resources through Vending

The poorly regulated transportation of tourists within Petra by means of horses and donkeys has caused substantial damage to archaeological resources. Over recent years, the hooves of donkeys have almost completely destroyed the original Nabataean steps that lead to Ad-Dayr (“The Monastery”) to the north of the core area of the ancient city. Residents of Um Sayoun provide this service, and are quick to point out that the residents of Wadi Musa provide horse and horse and carriage rides to visitors entering through the main gate at Petra, as noted by Farajat in this publication. Providing this service to visitors has also produced considerable damage to archaeological resources. Because the amount of money horse vendors make depends upon the number of rides that they sell, they ride horses back from the entrance of the Siq to the entry gate as quickly as possible. For years, tourists walking toward the Siq the through the valley called the Bab el-Siq encountered horses ridden at full gallop in the opposite direction. This presented a serious safety hazard. The solution, devised in the absence of an environmental assessment (as have been all projects do date), was to widen the path through the Bab el-Siq and build a low wall down the middle. This created two lanes, one for horse vendors and the other for tourists. Doing so changed what had previously been a stroll down a bucolic valley in which oleander grew in the adjacent stream bed, and the first tombs were seen in a pleasant setting, into a dusty and noisy walk from the entry gate to the relative shelter provided by the Siq. The construction and graveling of the road has also altered the hydrology of the Siq in ways that might or might not affect the preservation of the tombs along the Siq. In the absence of an environmental assessment of any kind, one cannot discount the possibility that such damage could result, and that it might be severe.

8.12 The Way Forward: Controlling the Juggernaut

Metaphors are by definition imperfect, seen as an interesting sort of “category mistake” in philosophy, yet instructive for the very reason that the imperfect

comparison they offer has a tendency to provoke thought as the mind searches for similarities and differences. The metaphor of the juggernaut that was introduced at the beginning of this chapter is an example. A better known example was provided by Max Black (1962: 36) in his seminal work, *Models and Metaphors*. In this he examines the term “light waves,” noting that sometimes it behaves as waves, sometimes as a stream of particles. It can be useful to think of light behaving in one way or the other depending upon one’s interests and objectives. One can see that they are useful because these metaphors have inspired mathematical models that have been proved or disproved by testing. That is, a good metaphor can point the way toward real solutions. As Giddens pointed out when he compared modernity to a juggernaut, there is real chance that modernity will destroy itself unless we come to understand and then direct its course by the use of critical thought.

With that in mind, a second metaphor might be helpful: the metaphor of flow at Petra. The flow of people can be usefully compared with the flow of water for the reason that doing so provides a way to think about what must be done to preserve the archaeological resources there. Because archaeological resources have been damaged and will inevitably suffer more damage if those with an interest in preserving Petra do not think and act in new ways, it seems worthwhile to consider here how the movement of water and visitors through Petra are similar and different.

The comparison might begin with the role played by both water and visitors to the structure and maintenance of human occupation there. Water made human life at Petra possible, both to small groups of hunters and gatherers in prehistory and later to the cosmopolitan inhabitants of the built city. One could say the same about visitors: those who came to live and trade there were obviously essential in ancient times. On the other hand, water has been a destructive force at Petra. We have seen how it introduces salts into the sandstone from which tombs are carved, which then forms crystals that expand and force apart grain in the sandstone, which eventually crumbles. Water also finds its way into cracks produced by percussion or by alternate heating and cooling on the thin, brittle surface that forms on sandstone. It erodes the softer stone beneath, causing the shell to spall away. During flash floods, large volumes of water moving at high velocity erodes sandstone, and carries material that strike and damage the monuments. The floods also erode soils that contain archaeological deposits, destroying the context that is essential to interpreting subsurface remains. In many ways, the movement of great numbers of tourists through Petra produces similar results. Tom Paradise in a previous chapter describes in detail how visitors produce abrupt changes in humidity inside tombs and have abraded sandstone in tombs and at the Petra theater. Anyone can see how visitors lean against and sit on ancient walls at Petra. Visitors also provide a market for illegally acquired antiquities.

Both the flow of water and that of visitors, then, can be beneficial to the preservation of the site or can produce grave damage to it. The difference is in how the flow is managed. If flows are regulated properly, the site will prosper. If not, ultimately the site will be destroyed, not only in terms of its scientific and historic value, but also in terms of its aesthetic and economic values. Petra now has the

attention of the world, but the world in these times of rapid change and global communication has a short span of attention. While economically emerging countries will provide new tourists, they will also provide many new tourism destinations that might appear more exotic and appealing than those that have suffered from over exposure and a loss of authenticity.

Conceptualize Petra not as a recreational park, in which many people are enticed to spend great lengths of time, but as a museum or a laboratory, in which visitors are made aware of the fragile nature of the antiquities there and are provided opportunities to learn more and enjoy related experiences outside Petra. A visit to the site should be the touchstone for interpretation; interpretation itself should occur for the most part at places that do not contain fragile resources, and where local communities have been or will be established.

This will be essential for the preservation of the site, but can also yield substantial economic benefit. As such, visits should be relatively short and the flow of visitors should be regulated so as to eliminate torrential flows that force individuals against the sandstone from which the tombs are carved, encourages people to clamber on ruins, and crowding, and generates frustration and confusion that can impel people to other thoughtless, destructive acts.

8.13 The Essential Role of Site Management

The most successful preservation efforts at Petra have been those most closely linked to site management. Informed by noninvasive and nonintrusive research conducted by Paradise, steps have been taken to reduce access to vulnerable antiquities. A measure of this vulnerability is that at Al-Khazna, Paradise recorded a loss of a half-meter of sandstone on one interior wall just within a 3/4 m area in a decade. Visitors are now not allowed inside Al-Khazna. Such preventative preservation management could and should be more widely used.

As mentioned in the introductory chapter, visitor flow at Petra is highly problematic, with unregulated numbers of tourists channeled through and abrading carvings in sandstone at “pinch points,” tourists allowed access to tombs and other structures where they come in contact with and erode the friable sandstone from which they are constructed and alter humidity, and tourists allowed and even directed into backcountry areas where they encounter antiquities without surveillance from Petra Archaeological Park staff, and are offered antiquities for sale. Further, there have been numerous instances of staging events in sensitive areas. In the past this has included the very constricted area in the Siq just in front of Al-Khazna, in a variety of tombs, in the Theatre, and at “Little Petra,” which is the canyon about 7 km north of the core area of Petra, containing numerous Nabataean tombs, some of which are painted the decorative designs probably dating to the first century AD. In addition to damage from abrasion and humidity changes, tombs and structures have suffered during these events from graffiti, vandalism,

and damage caused by impromptu efforts to decorate tombs, fires, and garbage disposal.

The first step, which should be taken immediately, is to regulate the flow of visitors through the site, especially where this flow encounters vulnerable structures and subsurface archaeological sites, which is to say those structures and subsurface sites that are not under the watch of alert park rangers or guards of other sorts. Until the cadre of effective guards put into place, the number of visitors should be drastically reduced and not allowed into areas out of sight of rangers and other visitors. This would mean that visitors would be restricted to the main core of the site.

The concern with managing visitation must extend outside the boundaries of Petra Archaeological Park to areas that are crucial to maintaining an environment conducive to preservation of the archaeological sites there. As presented in [Chap. 5](#), the flow of water into Petra has increased as development has mushroomed in the area around the ancient city core. This water is almost surely the single most destructive agency working at Petra. Logically, by preventing further development upslope from the ancient core and by seeking engineering remedies for the increased volume and velocity of flow produce by previous development, the rate of degradation could be greatly slowed. Regulatory and engineering solutions would be more effectively formulated if a precise surface model of the region were developed. This could be done using very mature and now standard technologies, LIDAR for example, at a small fraction of the funds devoted to tourism development each year.

8.14 Petra and the Future of the World Heritage List

The World Heritage Convention will celebrate its 40th anniversary in 2012. This is an appropriate time to assess how the World Heritage List has advanced or hindered the broad goals of the Convention. From this perspective, the inscription of Petra and other globally important archaeological sites on the World Heritage List must be seen as having been premature. Given the global destruction of the archaeological record and the great probability that even more of it will be destroyed by rapid industrialization and development around the world, the World Heritage List should be comprised of sites that are not only of outstanding universal significance, but that are places where the commitment to preservation laid out in the World Heritage Convention is fully realized.

Lists of must-see places abound. There are numerous books bearing titles such as “100 places to visit before you die,” there are well intentioned tomes that will direct one to the most sacred and inspirations sites in existence, and there are any number of guidebooks to countries and regions that will identify iconic cultural and natural sites. Recently, a “New Seven Wonders of the World,” was determined by popular vote. Yet the only list of sites that has been established for the express purpose of promoting preservation of cultural sites and conservation of

natural sites is the World Heritage List. Sites so listed should be exemplars of preservation and conservation practice. They should not be inscribed if such management is not in existence, or the commitment is not made and honored to put such management in place within a reasonable, predetermined time. Sites not demonstrating effective management should be placed on the List of World Heritage in danger. Sites should be removed from the World Heritage List if effective management is not put into place within carefully established time frames.

None of this will be possible without reform of the procedures followed by the World Heritage Committee. The committee must clearly place preservation ahead of tourism. At present, this cannot be seen to be the case. At the 2011 World Heritage Committee meeting in Paris, 28 additional properties were inscribed on the World Heritage List, although ICOMOS endorsed only 12 of those nominated. As reported by ICOMOS President Gustavo Araoz (Araoz G (2011) personal communication) in an e-mail sent to ICOMOS members:

The Prime Minister of a country whose nomination earned a deferral recommendation by ICOMOS this year was reported to have stressed to the press that this initiative was “very important” to Government and promised it would be pursued “with all the vigor at our command.” The property was indeed inscribed, and the press reported that he was “overjoyed at the news, stating that World Heritage Site status should boost his country as a tourism destination.”

To maintain the integrity of the World Heritage List and therefore its value as a tool by which to implement the World Heritage Convention, the World Heritage Committee must, further, oversee tourism to ensure that the sorts of destructive activities so evident at Petra and other archaeological sites on the World Heritage List are not permitted, and that development associated with tourism is managed in ways that prevent damage to the inscribed site. Unless this is done, the World Heritage List will eventually be widely seen as a superfluous collection of recommended tourist destinations. It will be an embarrassment that threatens the World Heritage Convention, and as such an example of a failed international treaty at a time when the world desperately needs to establish additional means for international cooperation and collaboration in order to address common environmental and economic problems.

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Erratum to: Tourism and Archaeological Heritage Management at Petra

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