Hierapolis-Pamukkale

2020 Conservation Outlook Assessment

SITE INFORMATION

Country: Turkey
Inscribed in: 1988
Criteria: (iii) (iv) (vii)

Deriving from springs in a cliff almost 200 m high overlooking the plain, calcite-laden waters have created at Pamukkale (Cotton Palace) an unreal landscape, made up of mineral forests, petrified waterfalls and a series of terraced basins. At the end of the 2nd century B.C. the dynasty of the Attalids, the kings of Pergamon, established the thermal spa of Hierapolis. The ruins of the baths, temples and other Greek monuments can be seen at the site. © UNESCO

SUMMARY

2020 Conservation Outlook

GOOD WITH SOME CONCERNS

Finalised on 02 Dec 2020

The natural values of Hierapolis-Pamukkale, as well as its cultural attributes, attracted a flood of tourists to visit the site which in turn stimulated the rapid growth of tourist infrastructure. The diversion of spring water to feed hotel pools, pollution by sewage, mechanical damage to the stone, tourist bathing and littering in the pools diminished them and began to turn the travertine grey. Moreover, the thermal water flow that feeds the travertine decreased compared to previous times. The encroaching hotel development was therefore pushed back and the commercial use of water came under control. As a consequence the quality of the travertine deposit returned. However, high tourist numbers are still an issue which requires careful management for which the current level of staffing is insufficient. There are still some concerns about the clarity of institutional responsibilities between different authorities and lack of cooperation between them. There is an urgent need to establish a management unit with representatives from all relevant agencies. There may also be a need to revise the current management plan with integration of social, cultural, economic and natural values at larger landscape level.
FULL ASSESSMENT

Description of values

Values

World Heritage values

▸ Visually stunning landscape of calcite deposits forming white travertine terraces

Calcite-laden waters from hot springs, emerging from a cliff almost 200 metres high overlooking the plain, have created a visually stunning landscape at Pamukkale. These mineralized waters have generated a series of petrified waterfalls, stalactites and pools with step-like terraces, some of which are less than a meter in height while others are as high as six meters. Fresh deposits of calcium carbonate give these formations a dazzling white coating. The Turkish name Pamukkale, meaning “cotton castle”, is derived from this striking landscape (World Heritage Committee, 2013).

Other important biodiversity values

▸ Plant endemism

According to Ecologically Based Scientific Research Project of the Conservation Sites of Denizli and Aydin provinces (2016), there are 50 endemic plants (2 EN, 2 VU)

Assessment information

Threats

Current Threats

The main current threat to the site’s integrity is from tourism infrastructure development and high tourist numbers, domestic sewage, and acid rain resulting from air pollution. Pamukkale is one of the top ten visited tourism destinations among the archaeological sites in Turkey (2015 DÖSİM tourism statistics). According to the archaeological site statistics in 2014 there were 1,874,657 visitors and in 2015 there were 1,731,271 visitors in Hierapolis. However, in 2016, this number decreased to 974,508. This showed an overall decline in tourist numbers in the recent years, which has been furthered due to the outbreak of COVID-19, despite a planned recovery of the tourism market. Threats from tourism infrastructure to spring water and natural assets have been reduced thanks to measures taken in line with the management plan. However, anthropogenic pollution from trace elements and acidity in wet deposition around the site represent a threat to the travertine (Cukurluoglu, 2017).

▸ Tourism/ Recreation Areas

(Tourism infrastructure)

Tourism infrastructure has been built by both the municipality of Denizli and by private enterprise and includes hotels, motels and swimming pools (UNEP-WCMC, 2011). Threats from infrastructure have been reduced thanks to several measures, including demolition of hotels inside the park in line with the management plan. Currently there are no threats to the travertine terraces caused by tourism infrastructure (IUCN Consultation, 2017).
IUCN World Heritage Outlook: https://worldheritageoutlook.iucn.org/
Hierapolis-Pamukkale - 2020 Conservation Outlook Assessment

► **Dams/ Water Management or Use**
  *(Use of water for tourism and agriculture)*
  
  It was stated in the project report for “Determination of biodiversity of Pamukkale Special Environmental Protection Area” in 2010 that water regulation and flow was negatively affected by use of water at tourism locations and agriculture. Agricultural lands within the upper basin may affect and pollute the water (IUCN Consultation, 2017). Since there is no research and landscape level planning, the impacts at upper basins are not known. The main pollution is at the archaeological pool due to high tourist numbers.

► **Water Pollution**
  *(Water pollution)*
  
  Pollution from sewage and constant tourist bathing in natural pools was reported as a threat at the time of inscription (IUCN, 1988). Organic pollution at travertine ponds due to tourism and agriculture has also been reported more recently (Cinar Muhendislik, 2010). A recent study found that ‘trace elements that reach travertine by wet deposition may be viewed as a risk because of the anthropogenic origins of air pollutants’ due to high concentration values of trace elements in precipitation samples as well as acidic rain events (Cukurluoglu, 2017).

► **Dams/ Water Management or Use**
  *(Diversion of spring water)*
  
  Water regulation in the site has improved in recent years due to strict measures to control tourism infrastructure (hotels etc.). Calcite deposits have been recovering and there is enough water discharge for travertine terraces (IUCN Consultation, 2017).

► **Tourism/ visitors/ recreation**
  *(Impacts from tourism)*
  
  High tourist numbers (more than one million tourists in some years) had been identified as an issue of concern (State Party of Turkey, 2006). Pamukkale is the one of the top-ten visited tourism destination among the archaeological sites in Turkey (2015 DÖSİMM tourism statistics). According to archaeological site statistics in 2014 there were 1,874,657 visitors and in 2015 there were 1,731,271 visitors in Hierapolis. However in 2016 this number decreased to 974,508. This shows an overall decline in tourist numbers in the recent years. However, there is still some impact due to unplanned and uncontrolled tourism. The management plan needs revision and an integrated plan should be prepared which considers tourism, nature conservation, socio-economic and rural development as a whole (IUCN Consultation, 2017). In 2020, the outbreak of COVID-19 has significantly reduced tourism numbers for the year, however reports suggest that local hotels and tourism associations are still targeting around one million visitors for 2020 (Daily Sabah, 2020).

**Potential Threats**

Earthquakes have been identified as a potential threat the travertine terraces; however, it is considered as a low threat.

► **Earthquakes/ Tsunamis**
  *(Earthquakes)*
  
  Earthquakes are the only identified potentials threat to travertine terraces (IUCN, 1988). In 2017, earthquakes in southern part of Aegean Sea have increased but no impacts have been recorded in Denizli Province. The quantity of water within the World Heritage site is mostly affected by earth movements. The earth movements may change the flow of water within the limestone system. At the moment, there is adequate water for travertine terraces (IUCN Consultation, 2017).
Overall assessment of threats

Overall, threats to the Pamukkale travertine are low. The main current threat to the site’s integrity is from tourism infrastructure development and high tourist numbers, as well as domestic sewage and pollution deposited by precipitation. Tourist numbers have been declining in the recent years, which has been compounded in 2020 by the COVID-19 outbreak, and threats from tourism infrastructure to spring water and natural assets have been reduced thanks to measures undertaken in line with the management plan. However, tourism numbers are still high and there is a need for better planning and increased capacity with regards to tourism management.

Protection and management

Assessing Protection and Management

Management system

Hierapolis-Pamukkale is legally protected through national conservation legislation. The responsibility for managing and conserving the World Heritage site is shared by the national Government (the Ministry of Culture and Tourism and the Ministry of Environment and Urbanization), local administration (The Governorship of Denizli) and several State institutions. The approval of the Regional Conservation Council and Provincial Directorate for Environment and Urbanism has to be obtained for physical interventions and functional changes in the site (World Heritage Committee, 2013). There is an environmental plan which was approved in 2011 for three provinces including Denizli Province. There is also a 1/25000 scale environmental plan but it doesn’t include the heritage site. There is a need to revise the management plan at the landscape level. The main concern is the lack of a single management unit at the site with representation from all relevant stakeholders. At the moment, the local museum directorate is responsible for the management of the site. In the past during management planning, an integrated management unit was defined, but has never been established. Other two bodies involved in the management of the site are the Protection Committee of the Ministry of Culture and Tourism and the Regional Commission of Ministry of Environment and Urbanism. Both work together and include representatives from each Ministry’s local authorities. Decisions taken by the Protection Committee are presented at the Regional Committee for a final decision.

Effectiveness of management system

A number of issues impede effective management of the site, including lack of clarity among different authorities with regards to the responsibility for the site and absence of a single management unit for the entire site with an adequate number of staff. There is a lack of evidence to suggest that these issues have been sufficiently addressed, and therefore some concern remains over the effectiveness of the management system.

Boundaries

Status of boundaries of the site considered adequate. No buffer zone has been defined (State Party of Turkey, 2006).

Integration into regional and national planning systems

There is an environmental plan which was approved in 2011 for three provinces including Denizli Province. There is also a 1/25000 scale environmental plan but it doesn’t include the heritage site. There is a need to revise the management plan at the landscape level. Previous concerns surrounding the diversion of spring water to feed local demand, including the tourist industry, which requires planning at the regional level, appear to have been addressed through the deconstruction of hotels within the site boundaries. Nonetheless, there appears to remain a lack of clarity between institutions
Hieropolis-Pamukkale - 2020 Conservation Outlook Assessment

responsible for particular elements of the site's management. The Ministry of Culture and Tourism is responsible for activities to control tourism movement, archaeological excavations and daily management of the heritage site. The Museum Directorate is responsible for the archaeological site including travertine terraces; whereas the General Directorate of Protection of Natural Assets is responsible for environmental planning, and management and monitoring of natural assets. However, there is neither a representative body nor a management unit at the site. Therefore, integration into regional and national planning systems remains of some concern.

**Relationships with local people**

For an increased brand image in Pamukkale there is a need of increased collaboration among stakeholders. There should be social, economic and cultural research to define the integration of local culture in management. Local people should receive more benefits from the tourism by increasing the quality of their services and defining quality standards. The benefits from tourism are mostly received by large companies and there is less income generation for local people.

**Legal framework**

Hieropolis-Pamukkale is subject to the National Conservation Law (No: 2863) as being the 1st and the 2nd Degree Archaeological and the 1st Degree Natural Site. In 1990, the site was registered as ‘Special Environmental Protection Area’. Conservation Plan was approved in 1991 and revised in 2002. An adequate legal framework for the maintenance of the Outstanding Universal Value including conditions of Authenticity and / or Integrity of the World Heritage property exists but there are some deficiencies in implementation (State Party of Turkey, 2014). Overall, whilst there are several legislative instruments in force - for the archaeological site, and protection and management of the environment; there is little harmonization between them (IUCN Consultation, 2017).

**Law enforcement**

Data Deficient

**Implementation of Committee decisions and recommendations**

Mostly Effective

Measures had been taken, in line with the management plan, to ensure better control of tourism activities (IUCN Consultation, 2017), which was one of the areas of concern in previous World Heritage Committee Decisions (e.g. World Heritage Committee, 1990). There have been no recent Committee Decisions on this site, except the one adopting its Retrospective Statement of OUV (World Heritage Committee, 2013).

**Sustainable use**

Data Deficient

**Sustainable finance**

Mostly Effective

Major funding comes from entrance fees, Authority of Protected Special Areas, Italian Archaeological Mission for excavation, UNDP, and World Bank. There is annual funding from the Government but there should be a share from tourism income to ensure a better management. Previously assessments funding for protection and conservation was considered to be adequate, but insufficient in terms of management (State Party of Turkey, 2006). There is no available information to suggest this has changed since then.

**Staff capacity, training, and development**

Some Concern

The 1992 Pamukkale Management plan proposed a staff consisting of a superintendent, administrative officer, chief of visitor services and chief of maintenance (State Party of Turkey, 2006). Current staff numbers are considered insufficient (IUCN Consultation, 2017).
Education and interpretation programs

Site museum, information booths, guided tours, trails/routes and information materials are considered adequate. Visitor routes and information panels have been provided within the site (State Party of Turkey, 2014). However, interpretation, guiding, information panels and communications in general have been considered in need of improvement.

Tourism and visitation management

Some previously identified threats from infrastructure had been reduced thanks to several measures, including demolition of hotels inside the park, in line with the management plan (IUCN Consultation, 2017). Six hotels and the structures around the thermal pool threatening the site's values have been demolished; entry of the private vehicles into the site has been forbidden except for emergencies; public transportation has been provided for visitors; the road passing through the south-eastern travertine terraces has been closed (Periodic Report, 2014). However, there is a need for a revision of the management plan and planned tourism at regional level.

Monitoring

There appears to be no formal monitoring programme. A project-funded monitoring of algal flora at travertine terraces and thermal springs was undertaken between 2010-2011 (Çınar Mühendislik, 2010). General Directorate of Protection of Natural Assets, through private sector engagement, had monitored water quality and treatment facilities between 2012-2015 (www.csb.gov.tr). A more recent partnership has been established between the Denizli Museum and Pamukkale University with a number of Italian archaeological institutions, however this is focussed around the archaeology of the Hierapolis component of the site, rather than the natural values of the Pamukkale travertine (Italian Government, 2018).

Research

Recent scientific investigations have proved the role of cyanobacteria in the precipitation of the travertine (Zedef et al., 2003; UNEP-WCMC, 2011). More recent research has indicated the sources of pollution from wet deposition which may adversely affect the travertine (Cukurluoglu, 2017). There is some published research on tourism perceptions (Aktas, 2018; Soylu et al., 2018), however there is no clear link to the site's tourism management plan.

Overall assessment of protection and management

Since the inscription of the site in 1988, improvements to the protection and management of the site have been made, including the management plan for protection of the landscape and environment, and measures taken to reduce the impacts of over-tourism and unsustainable visitation practices that were affecting the values of the site. However, some concerns remain. Although the site has been under the supervision of a steering group since 2000, there is no site manager/coordinator and there are some concerns with regard to the management structure. There are two authorities responsible for the management of site and uncertainties remain regarding their responsibilities and the level of coordination between them. Also of some concern are levels of staffing, staff training and development, education and interpretation programs and particularly tourism management. Both the archaeological and cascade areas have hundreds of thousands of visitors each year but there are too few guards and enforcement of regulations are weak.

Assessment of the effectiveness of protection and management in addressing threats outside the site

According to Gavra (2012), there are several managerial problems at heritage sites of Turkey. There are listed as 1) lack of adequate and effective planning, 2) lack of buffer zone outside, 3) lack of awareness among local people, 4) inadequate administrative structure and appropriate staff, 5) communication of and cooperation with stakeholders and 6) inadequate financial resources (Gavra,
**State and trend of values**

**Assessing the current state and trend of values**

**World Heritage values**

▶ **Visually stunning landscape of calcite deposits forming white travertine terraces**

| Low Concern | Trend: Stable |

Both the archaeological and cascade areas have many hundreds of thousands of visitors each year, but there have been too few guards and too little enforcement of regulations. In 1990, the degradation was obvious during the evaluation mission. The diversion of spring water to feed hotel pools, pollution by sewage, mechanical damage to the stone and constant tourist bathing and littering in the pools diminished them and began to turn the travertine grey (Dilsiz, 2002). Moreover, the thermal water flow that feed travertine has decreased compared to previous times. If flow rate of water decreases further due to natural or human factors (illegal drilling, etc.) the future of travertine would be in danger just as in past years (Somuncu, Yiğit and Yoldaş, 2008).

The encroaching hotel development was therefore pushed back from the edges of the natural formations and the commercial use of water came under control. Bathing in the pools was prohibited and access limited to certain paths. As a consequence the quality of the travertine deposit returned (UNEP-WCMC, 2011). However, more recent concerns have been noted, which highlight the lack of capacity in staff to enforce bans and overcrowding in the travertine, which may cause damage to this value if not effectively managed.

**Summary of the Values**

▶ **Assessment of the current state and trend of World Heritage values**

| Low Concern | Trend: Data Deficient |

The natural values of Hierapolis-Pamukkale are confined to the beauty of the calcite-laden waters which over millennia have created a snow-white landscape of petrified waterfalls. The problem of over-use of this site by tourists has been a long-term issue, having been noted at the time of inscription of the site. Previous issues including the diversion of spring water to feed hotel pools, pollution by sewage, mechanical damage to the stone and constant tourist bathing and littering in the pools, had significantly diminished them and began to turn the travertine grey. The encroaching hotel development was therefore pushed back from the edges of the natural formations and the commercial use of water came under control. Bathing in the pools was also prohibited and access limited to certain paths, resulting in improved status of the travertine. However, the current lack of capacity to enforce these regulation may negatively impact the travertine in the future, if not addressed fully.

▶ **Assessment of the current state and trend of other important biodiversity values**

| Low Concern | Trend: Data Deficient |

According to Ecologically Based Scientific Research Project of the Conservation Sites of Denizli and Aydın provinces (2016), there are 50 endemic plants (2 EN, 2 VU). There is no recent information available on the monitoring of these species.
Additional information

Benefits

Understanding Benefits

► Wilderness and iconic features

This site is exceptional because of its calcite-laden waters that have created a snow-white landscape of petrified waterfalls, step-terraced pools and stalactites on a hillside cliff almost 200 m high above a plain. (UNEP-WCMC, 2011).

► Outdoor recreation and tourism

More than one million tourists visit Hierapolis-Pamukkale every year and provide an important source of income for communities in and around the site as well as the global tourism industry. In response to the inflow of visitors, tourist infrastructure has been built by both the municipality of Denizli and by private enterprise and includes hotels, motels and swimming pools.

Factors negatively affecting provision of this benefit:
- Pollution: Impact level - High
- Overexploitation: Impact level - High

► Water provision (importance for water quantity and quality)

There are 17 thermal water sources with temperatures ranging from 35-100 C. The geothermal source has been irresponsibly used by houses, motels and hotels without considering re-injection for years. In order to get benefit in accordance to its natural balance, General Directorate of Protection of Natural Assets, Denizli Governorship and General Directorate of Mineral Research and Exploration have been working in coordination. The main utilization of geothermal energy in SEPAs is for domestic heating, greenhouses, spas and thermal resorts (Taşeli, 2016). The geothermal quality of water inside the area is not enough for producing energy.

Factors negatively affecting provision of this benefit:
- Overexploitation: Impact level - Moderate

Summary of benefits

By conserving the superlative natural landscape of Hierapolis-Pamukkale the communities in and around the site as well as the global tourism industry benefit from the income provided by over one million tourists a year. Landscape level analysis and planning is required to define benefits and their beneficiaries in order to manage the flow and prevent unsustainable use.

Projects

Compilation of active conservation projects

<table>
<thead>
<tr>
<th>№</th>
<th>Organization</th>
<th>Brief description of Active Projects</th>
<th>Website</th>
</tr>
</thead>
</table>
# REFERENCES

<table>
<thead>
<tr>
<th>No.</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>DÖSIMM. 2014. Müze ve Örenyerleri Ziyaretçi ve Gelir İstatistikleri (Museum and Archaeological Site Visitor and Income Statistics)</td>
</tr>
<tr>
<td>9</td>
<td>IUCN Consultation. (2013). IUCN World Heritage Confidential Consultation: Hierapolis-Pamukkale</td>
</tr>
<tr>
<td>10</td>
<td>IUCN Consultation. (2017). IUCN World Heritage Confidential Consultation: Hierapolis-Pamukkale, Turkey</td>
</tr>
<tr>
<td>15</td>
<td>Nature Law Watch Initiative Members, Ankara, June 2010</td>
</tr>
<tr>
<td>18</td>
<td>State Party of Turkey (2006). Periodic Reporting Cycle 1</td>
</tr>
<tr>
<td>№</td>
<td>References</td>
</tr>
<tr>
<td>----</td>
<td>---------------------------------------------------------------------------</td>
</tr>
<tr>
<td>21</td>
<td>World Conservation Monitoring Centre (WCMC), Infobase, Jan 1992.</td>
</tr>
<tr>
<td>22</td>
<td>World Heritage Centre, UNESCO (whc.unesco.org/en/list/485)</td>
</tr>
</tbody>
</table>