

## World Heritage Sites

### Protected Areas and World Heritage



## HIERAPOLIS - PAMUKKALE TURKEY

*At Pamukkale ('Cotton Castle') calcite-laden waters 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. Beside this site, at the end of the 2nd century B.C, a Greek Attalid king of Pergamon established the cult centre and thermal resort of Hierapolis. The partly restored Roman ruins of its baths, temples, colonnaded main street, theatre, necropolis and other monuments can still be seen.*

### COUNTRY

Turkey

### NAME

Hierapolis-Pamukkale

### MIXED NATURAL AND CULTURAL WORLD HERITAGE SITE

1988: Inscribed on the World Heritage List under Natural Criterion vii and Cultural Criteria iii and iv

### STATEMENT OF OUTSTANDING UNIVERSAL VALUE [pending]

### IUCN MANAGEMENT CATEGORY

Unassigned (Special Area of Environmental Protection)

### BIOGEOGRAPHICAL PROVINCE

Mediterranean Sclerophyll (2.17.07)

### GEOGRAPHICAL LOCATION

Situated in southwest Turkey, 250 km east-southeast of Izmir and 22 km north of the city of Denizli, on the north side of the Cürüksu River, a tributary of the Menderes, at 37° 57'N and 28° 50'E.

### DATES AND HISTORY OF ESTABLISHMENT

1969: A management plan for the area was prepared but not officially approved;

1989: Work on setting up a National Park begun by the government under the Laws of Ancient Monuments 1710 of 1973 and of Preservation of Cultural and Natural Values 2863 of 1983;

1990: Area decreed a Special Area of Environmental Protection to prevent degradation by development;

1992: Environmental Management and Monitoring Plans for Pamukkale issued.

### LAND TENURE

State ownership. Managed mainly by the Municipality of Denizli.

### AREA

None given. The management plan suggests it should be large enough to include all the significant natural and historical features associated with the site.

## ALTITUDE

Around 500m. The mountains just north of the site rise to 1,840 m.

## PHYSICAL FEATURES

Pamukkale is on the slopes of Cal Dağı in the foothills of the Cökelez Mountains, part of the western Taurus Mountains which parallel the Mediterranean inland, and looks across the wide valley of the Cürüksu River, a tributary of the River Menderes, to the mountains of Babadag (2,308m) and Honaz (2,571m). The site is on a hillside cliff 150-300 meters above the valley, where calcite-laden waters have created a snow-white escarpment of petrified cascades. The chief features of the site are its 20m-high travertine cliffs on the upper third of the slope, with waterfalls of stone and semicircular pools dammed behind stepped terraces 1 to 6 meters high. The highest terrace extends some 6km to the village of Karahayit where there are smaller terraces of reddish travertine.

At the crest of the cliff are four hot springs which give an average flow of 250 litres per second at a constant temperature of 35°C which have always been held to have healing properties. The water probably originates from a fault in the contact zone between Mesozoic crystalline rocks and layers of the Neogen series. The deposits are formed from the high calcium bicarbonate content of the water. This is precipitated biologically through the presence of a thin layer of cyano-bacteria 1 to 1.5mm beneath the surface of the travertine which causes the precipitation of the calcite in underwater sills and give some pools a greenish color (Zedef *et al.*, 2003) The cooler edges form faster, growing upwards to form natural weirs which the water spills over, ribbing their overhanging walls with stalactites. Continual fresh deposits of calcium carbonate give the pools and travertine waterfalls a coat of dazzling white, though in the 1990s this began to turn a dingy grey and the flow lessened. The oldest rocks in the area are crystalline marbles, quartzites and schists located in the northern parts of the proposed park area, some of which were quarried in Roman times. Most of the rocks are of the Pliocene period. The springs feed part of a complex hydraulic system extending 70km to the north-west to Alasehir and west along the valley of the Menderes River. These canals take water to nearby villages and fields and where the flow is shallow and slow, some have accumulated travertine deposits up to 10m high.

The south-eastern section of the terraces which are 2,500m long by 500m wide is the site of the thermal springs and pools and the considerable ruins of the Graeco-Romano-Byzantine town of Hierapolis which was founded around the springs. These cover 1,000 by 800 meters and, both in antiquity and since, have suffered devastating earthquakes. Some buildings at the lowest end of the town have become partly embedded in travertine.

## CLIMATE

The climate is quite mild, in summer being cooler than the nearby plains. Temperatures are high in July and August, with an average maximum of 34°C, with January temperatures dropping to an average of 1°C. Humidity is high in summer and precipitation highest in December, January and February, up to 3,500mm, mostly in the form of snow. Winds are most frequently from the north-west.

## VEGETATION

In 1969 the vegetation map of the proposed park showed land use cover in descending order of area as: cultivated land, bare land subject to erosion, bare land, urban areas and maquis. The extended area around the site is 33% agricultural, and with 41% forest, meadow and pasture. Crops produced under irrigation include wheat, barley, corn, cotton, tobacco and opium poppies, chickpeas, lentils, sugar beet, fruit and vegetables. There are records of some 45 species of flowering plants, not all necessarily from the proposed Park area.

## FAUNA

Within Denizli province there are records of ten mammals including grey wolf *Canis lupus*, jackal *Canis aureus*, bear *Ursus arctos*, chamois *Rubicapra rubicapra asiatica* and wild boar *Sus scrofa*. Many species of birds including great bustard *Otis tarda* (VU) have been recorded on site and there could be

visitors from Lakes Acigol and Isikli 50-80 km east which are said to host over 200 breeding species, mainly waterbirds and piscivores.

## **CONSERVATION VALUE**

At Pamukkale calcite-laden waters have created a snow-white landscape of petrified waterfalls, and step-terraced pools on an almost 200m high hillside cliff above a plain. Beside this site at the end of the 2nd century B.C, the Greek Attalid kings of Pergamon established the town and thermal resort of Hierapolis. The mainly late Roman ruins of its baths, temples, colonnaded main street, theatre, necropolis and other monuments can still be seen at the site. The Park lies within the Conservation International-designated Mediterranean Conservation Hotspot, in a WWF Global 200 Freshwater Eco-region and a WWF/IUCN Centre of Plant Diversity.

## **CULTURAL HERITAGE**

This area of Phrygia on the road from the southern Aegean to Syria was the site of many ancient towns such as Laodicea and Colossae near present-day Denizli and there were settlements dating back to the Calcholithic late Neolithic period. The Greek town of Hierapolis (holy city) was founded on a plateau 150m above the Lycus valley at the end of the 2nd century BC by Eumenes II, an Attalid king of Pergamon. It developed on the site of an antique cult partly as a religious and health resort. The thermal springs and a cave venting poisonous gasses, the Plutonium, attracted health visitors, a festival and a flourishing wool industry, which used the cleansing and colour-fixing properties of the hot waters. Pergamon ceded the town to Rome in 133 BC. After two earthquakes in Roman times, the town was rebuilt, with a population of Roman colonists, Macedonian Greeks and Jews, becoming very prosperous in the 2nd and 3rd centuries, and these are the building ruins and foundations seen today. They include a colonnaded street and arch, an impressive 15-20,000-seat theatre with one of the best ornamented *scaena* (permanent backstage) in Asia Minor; also a nymphaeum (monumental fountain), two baths, one later a basilica, a temple over the Plutonium, one of the largest necropolises in Asia Minor, with 1,200 tombs. The town's plan was Hellenistic with the principal buildings lining a 1,190m colonnaded main street with side streets at right angles and gateways at each end. The town became the capital of Phrygia and was still important in the 4th and 5th centuries when it was a Byzantine bishopric and place of Christian pilgrimage. An octagonal Christian martyrium survives from that period.

## **LOCAL HUMAN POPULATION**

Denizli (population 61,000 in 1965, 304,800 in 2004) is the nearest town. Villages in the area in 1961 added a further 56,000 to the total surrounding population which was said to have quadrupled by 1990. Some 70% of these were then engaged in agriculture. Pamukkale itself is a tourist village. Textiles are still an important industry in the area.

## **VISITORS AND VISITOR FACILITIES**

Pamukkale ('Cotton Castle' in Turkish) is a very popular resort, sightseeing destination and picnic spot increasingly well visited by both Turks and foreigners, annually attracting 24,670 visitors even in 1968. There are now many more. Bathing in the pools is especially popular. Tourist infrastructure built by the municipality of Denizli and by private enterprise includes a wide range of hotels, motels and swimming pools, and some were built on the edge of the archaeological area. The one access road until recently crossed the pools. There is a small archaeological museum at Hierapolis. Since tourist over-use of the pools and diversion of water by hotels was beginning to degrade the area, tourist access is now controlled and public pools may be built to make up for the prohibition of bathing in the natural pools. Since 1995 an annual International Folk Music Festival has been held there (Anon, 1996). Another nearby resort is the red thermal springs of Karahayit, 5 km away. There are also many hotels and facilities in the city of Denizli, 22km away.

## **SCIENTIFIC RESEARCH AND FACILITIES**

The archaeological site of Hierapolis was first investigated by a German team in the late 19<sup>th</sup> century. It was extensively investigated and partially restored from 1957 onwards by teams funded by the Italian Ministries of Foreign Affairs and of Culture and the Environment, and the Italian National Research Council. This mission included archaeologists, engineers and architects who elucidated the plans of the town and main town buildings and restored several of them. It also studied the exceptional number of

funerary and other epigraphs. Many publications resulted from this work, which are detailed in the nomination document. The Hierapolis Museum in one of the Roman baths is an official institution funded and supported by the Turkish Ministry of Culture. Recent Turkish investigations have proved the role of cyanobacteria in the precipitation of the travertine (Zedef *et al.*, 2003).

## **MANAGEMENT**

The site was largely free from intrusive construction until the 1980s. All the major ancient buildings have been partly restored by the Italian mission, and several have been re-used, such as the road to the necropolis which was asphalted, and the installation of a museum and office in the largest of the baths. In 1969 a management plan was drawn up through USAID, but never acted on. In 1990 the site was declared a Special Area of Environmental Protection to prevent degradation by tourist development. In 1992 a UNESCO-backed environmental protection plan to keep Pamukkale white, the Pamukkale Development Plan was issued. As a result, the road through the terraces was closed, pedestrian access paths through the site were improved, hotels on the edge of the site demolished and new water conduits planned to supply new terrace pools for tourist bathing. In 2000 a World Bank / Ministry of Culture project (the Turkey Community Development and Heritage Project) included the preparation of a Pamukkale Site Management and Preservation Plan. This also encompassed a socio-economic assessment, the resettlement of squatters on the site and an association of local stakeholders all to be coordinated by the University of Pamukkale (IUCN, 2002).

## **MANAGEMENT CONSTRAINTS**

Both the archaeological and cascade areas have many thousand visitors each year but there have been too few guards and too little enforcement of regulations. By 1990 the degradation was obvious to observers from the IUCN. The diversion of the 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 a dingy grey (Dilsiz, 2002). The encroaching hotel development was therefore pushed back from the edges of the natural formations and the commercial use of the water came under control. Bathing in the pools was prohibited and access limited to certain paths by unshod visitors only. As a consequence the quality of the travertine deposit is returning.

## **STAFF**

The management plan proposed a staff consisting of a superintendent, administrative officer, chief of visitor services and chief of maintenance.

## **BUDGET**

No information is available. The World Bank granted US\$10 million for its Project in 2000.

## **LOCAL ADDRESS**

The Director, Tourism Office, Municipality of Denizli, Denizli Province, Turkey.

## **REFERENCES**

The principal source for the above information was the original nomination for World Heritage status.

Anon. (1987). Pamukkale (Hierapolis). NET. Turistik Yayinlar sonayive Ticaret A.S.

----- (1996). International and Turkish stars promote environmental protection for Pamukkale. *Turkish Daily News*, June.

Bean, G. (1971). *Turkey Beyond the Meander*. London.

De Bernardi Ferrero D. (1985). *I Recenti Lavori della Missione Archeologica Italiana a Hierapolis di Frigia 1978-80*. Rome.

Dilsiz, C. (2002). Environmental issues concerning natural resources at Pamukkale protected site, south-west Turkey. *Environmental Geology* 4(7):776-784.

General Directorate of Antiquities and Museums (1987). *Nomination of Hierapolis-Pamukkale for Inclusion in the World Heritage List*. Government of Turkey, Ankara. [12 archaeological references in Italian.]

Humann, C. *et al.* (1898). Altertümer von Hierapolis. *Erganzungshaft 4, Jahrbuch des Deutschen Archaeologische Instituts*, Berlin.

IUCN (2002). *Report on the State of Conservation of Natural and Mixed Sites Inscribed on the World Heritage List*. Gland, Switzerland.

USAID Project Team (1969). *Pamukkale National Park. Master Plan for Protection and Use*. Ankara.

Verzone, P. (1978). *Hierapolis di Frigia nei Lavori della Missione Archeologica Italiana*. Rome.

Zedef, V. *et al.* (2003) Causes of darkening of the Pamukkale travertine, Denizli, Southwest Turkey. *Fresenius Environmental Bulletin* 12, pp.1373-8.

## **DATE**

April 1988. Updated 4-2005, May 2011.