

World Heritage Sites

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TEIDE NATIONAL PARK SPAIN

Teide on the island of Tenerife is the highest mountain in Spain and at 7,500m above the sea floor, is the world's third largest volcanic structure. It is a shield volcano that combines a severely beautiful landscape, often wreathed in cloud, with a great variety of volcanic features with uncommon altitude-adapted endemic flora and invertebrate fauna. It has been long studied. The high unpolluted location makes it a natural laboratory for astrophysical research, for monitoring climatic change and global atmospheric pollution in addition to the study of the geological processes which created it.

COUNTRY

Spain

NAME

Teide National Park

NATURAL WORLD HERITAGE SERIAL SITE

2007: Inscribed on the World Heritage List under Natural Criteria vii and viii.

STATEMENT OF OUTSTANDING UNIVERSAL VALUE [pending]

The UNESCO World Heritage Committee issued the following statement at the time of inscription:

Teide National Park, dominated by the 3,781 m Teide-Pico Viejo stratovolcano, represents a rich and diverse assemblage of volcanic features and landscapes concentrated in a spectacular setting.

Criterion (vii): Mount Teide is a striking volcanic landscape dominated by the jagged Las Cañadas escarpment and a central volcano that makes Tenerife the third tallest volcanic structure in the world. Within this landscape is a superlative suite of landforms that reveal different phases of construction and remodeling of the volcanic complex and highlight its unique geodiversity. The visual impact is emphasized by atmospheric conditions that create constantly changing textures and tones in the landscape and a 'sea of clouds' that forms a visually impressive backdrop to the mountain.

Criterion (viii): Teide National Park is an exceptional example of a relatively old, slow moving, geologically complex and mature volcanic system. It is of global importance in providing diverse evidence of the geological processes that underpin the evolution of oceanic islands, and these values complement those of existing volcanic properties on the World Heritage List, such as the Hawaii Volcanoes National Park. It offers a diverse and accessible assemblage of volcanic features and landscapes in a relatively limited area. The area is a major centre for international research with a long history of influence on geology and geomorphology especially through the work of von Humboldt, von Buch and Lyell which has made Mount Teide a significant site in the history of volcanology.

The property is well managed and resourced, with a six-year management plan in place which is due for renewal in 2008. The property is afforded the same legal protection as other national parks in Spain and is surrounded by a buffer zone. Key management issues include the management of tourism, the potential impact of climate change, and effective coordination of management responsibility between national and regional levels of government.

IUCN MANAGEMENT CATEGORY

Teide National Park: II National Park
Teide Natural Monument: Unassigned

BIOGEOGRAPHICAL PROVINCE

Macaronesian Islands (2.40.13)

GEOGRAPHICAL LOCATION

Teide is the central peak of Tenerife, the largest of the Canary Islands which lie 320 km west of Africa and 1,380 km southwest of Spain at 28° 09'00" to 28° 20'02" N by 16° 29'00" to 16° 44'00" W.

DATES AND HISTORY OF ESTABLISHMENT

1954: Teide National Park (13,571ha) established by decree;

1994: Teide Natural Monument declared by Law No.12;

1981: The Peripheral Protection Zone was established by Law 5/1981; the National Park reclassified;

1989: Granted European Union Diploma Class A by the Council of Europe; extended 1994 & 1999;

2000: Corona Forestal National Park established by Decree 1/2000.

2002: Teide Management and Usage Administration Plan approved by decree 153.

2005: The Canary Islands designated a Particularly Sensitive Sea Area by the International Marine Organisation;

LAND TENURE

The land is 92.78% owned by eleven municipalities, one of which, La Orotava, owns 72% of the area. The state owns 7.2%, and 4 ha is owned by private communication companies. From 2007 the Park will be managed by the National Park Service under the Autonomous Community of the Canary Islands.

AREA

The nominated core area is 18,990 ha. The buffer zone of 54,127.9 ha comprises the Corona Forestal National Park (46,612.9 ha) and the Peripheral Protection Zone (7,515 ha). The whole area protected totals 73,117.9 ha.

ALTITUDE

1,650m-3,718m (Teide, 3,134m Pico Viejo)

PHYSICAL FEATURES

Teide is the highest mountain in Spain, an impressive stratovolcano in the centre of the island of Tenerife, the largest of the Canary Islands, a chain formed like the Hawaiian Islands by the passing of the under-lying lithospheric plate across a magma plume. The nominated core and associated protected areas cover over a third of the island. Its peaks of Teide and Pico Viejo rise 1,700m and 1,340m respectively from the encircling 16km-wide caldera of the huge ancient Las Cañadas (the springs) volcano, which erupted violently 200,000 years ago. The present volcano which is the third highest in the world after Mauna Loa and Mauna Kea, rises 7,500m from the ocean floor and was created over a long period by a low-intensity magmatic hot spot beneath an almost stationary tectonic plate. It is of great scientific interest because it concentrates in a palimpsest of successive eruptive and effusive landscapes a wide range of geological and magmatic features characteristic of such mid-plate oceanic islands.

Most notable is the vast caldera of the volcano created by a landslide, floored at the 2,000m level by lava fields, walled by a 600m escarpment of multicolored rocks, overlaid on the north side by the high volcanic summits rising out of it. The crescent-shaped floor of the caldera teems with a network of smaller volcanic mouths, cones domes, lava channels, dikes, lavas from light felsic flows to viscid red lavas and black obsidian blocks, ochre plains of sandy alluvial deposits and red and black volcanic ejecta, scoria, lapilli and pumice, from a long series of basaltic effusions. They form the most varied collection known of volcanic structures, forms and detritus. The rocky soil is droughty but nutrient- and mineral-rich, and of many colors, in one place, Los Azulejos, greenish in cast. Under the intense sunlight the harsh red-brown desertic colouring streaked with basalt and, in season, bright with flowers, are very striking.

CLIMATE

The island exists between warm temperate and subtropical zones. The mean annual temperature is 20°C, with lows below -15°C in winter and highs above 30°C in summer with extreme diurnal oscillations of more than 15°C. Overall the climate of gentle winters and dry summers is mellowed by the cold Canarian current but a thermal inversion and the mountain's height isolates it from marine influences, and Las Cañadas has a harsh climate; freeze-thaw processes near the summit create active periglacial forms. Annual precipitation is below 500mm, with more than half falling in winter, a third of it as snow which can last many months. A layer of cloud often hangs between 1,700-and 1,800m. The insolation is the highest in Spain which, with the low humidity and high atmospheric pressure, create an exceptionally limpid atmosphere. The mountain's location in a high pressure zone gives it atmospheric stability and constant winds throughout the year, but mostly in summer. The prevailing tradewinds blow from the northeast. Westerly storm winds can reach up to 200 km/h. Southern winds are linked with invasions of hot Saharan air.

VEGETATION

The vascular flora of the National Park numbers 220 species, 74 mosses, 8 liverworts and 100 lichens which are often the dominant vegetation. Since its protection as a National Park it has recovered from overgrazing. Two tree species occur: an occasional isolated Canary Island cedar *Juniperus cedrus* or Canary Island pine *Pinus canariensis*. Many of the 36 plants endemic to Tenerife are found in the Park and 16 are endemic to the Park itself. This high endemism is the result of adaptive radiation accelerated by the mountain's oceanic and altitudinal isolation and dryness acting on a flora which has conserved paleo-endemic species. Its most representative ecosystems are highland scrub and the peak ecosystem, both rich in species adapted to the rigours of high altitude: cushion form, protected leaves and high flower production. There is a mosaic of unsynchronised primary ecological succession related to successive lava flows and the slowness of plant growth in the cold dry conditions. Consumption by goats and wood-collectors has favoured plants which re-sprout over those sexually reproduced. Due to the proximity to Africa, its unique level of phylogenetic diversity is close to that of continental ecosystems and it has the most diverse high-mountain ecosystem of any Atlantic island. It exemplifies well how evolutionary forces can affect the flora and fauna of high ocean mountains.

The species endemic to the mountain include its two most representative species, sticky broom *Adenocarpus viscosus* and the widespread Teide white broom *Spartocytisus supranubius*, also Teide violet *Viola cheiranthifolia*, which grows up to the summit, Teide edelweiss *Gnaphalium teydeum*, dwarf bugloss *Echium auberianum*, the thistle *Stemmacantha cynaroides* and the Teide catmint *Nepeta teydia* var. *albiflora*. Other Canary Island endemics are shrubby scabious *Pterocephalus lasiospermus*, Teide daisy *Argyranthemum teneriffae*, red bugloss *Echium wildpretii*, flixweed *Descurainia bourgeauana* and *D. lemsii*, Canary Island wallflower *Erisimon scoparius* and Canary Island wall lettuce *Tolpis webbii*. A few kilometres outside the Park and summit area, congeners found include the legume *Adenocarpus foliosus*, the bugloss *Echium virescens* and the daisy *Argyranthemum frutescens*. Through colonization, the endemic *Stemmacantha cynaroides* is the only Canarian representative of a taxon found in the Atlas Mountains. Some characteristic endemics exclusive to the Park, such as Cañadas rockrose *Helianthemum juliae*, Teide edelweiss *Gnaphalium teydeum* or the thistle *Stemmacantha cynaroides* number only 200 specimens; of others, like the endemic Teide burnet *Bencomia exstipulata*, there are barely 60 specimens - almost 75% of the natural specimens of this species grow on the summits of Tenerife and La Palma. In addition to this floristic diversity, the Park has a noticeable number of vegetation units that generally define most of the habitats crucial to the conservation of biodiversity. Using the Council of Europe's Directive 92/43/EEC on the conservation of natural habitats and wild fauna and flora, the National Park has eleven Community Interest habitats which occupy 75% of its surface area.

FAUNA

The native vertebrate fauna of 29 species is not extensive: 5 bats, and 3 reptiles plus 5 introduced species: mouflon *Ovis gmelini musimon*, introduced for the hunt in 1970, Algerian hedgehog *Atelerix algiris*, rabbit *Oryctolagus cuniculus*, house mouse and black rat. The bats include the Tenerife long eared bat *Plecotus teneriffae* (EN), a Canary Islands endemic, Madeira Pipistrelle *Pipistrellus maderensis* (EN), endemic to Madeira and the Canaries and the commonest species, lesser noctule *Nyctalus leisleri*. The endemic reptiles are the Tenerife lizard *Gallotia galloti galloti*, the rarer Tenerife wall gecko *Tarentola delalandii*, endemic to Tenerife and La Palma, and west Canary skink *Chalcides viridanus viridanus*.

Only 16 birds are recorded, most noticeable among them being the blue chaffinch *Fringilla teydea teydea*, the wild canary *Serinus canaria*, Berthelot's pipit *Anthus berthelotii berthelotii*, the commonest bird, kestrel *Falco tinnunculus canariensis*, long eared owl *Asio otus canariensis* and Barbary partridge *Alectoris barbara*. However, in the lava crevices at least a 1,000 species of invertebrates. 71 are found exclusively in the National Park and 49% are endemic. 25 species endemic to the island are adapted to life in volcanic tube caves, four being found only in a single cave.

CONSERVATION VALUE

This iconic shield volcano combines a severely beautiful landscape composed of a great variety of long-studied volcanic features with uncommon altitude-adapted endemic flora and invertebrate fauna. The high unpolluted location makes it a natural laboratory for astrophysical research and for monitoring global atmospheric pollution and climatic change. The Park lies within a Conservation International-designated Conservation Hotspot, a WWF Global 200 Eco-region, is an IMO-designated Particularly Sensitive Sea Area (PSSA) and is protected under the EU Habitats and Birds Directives.

CULTURAL HERITAGE

The original population, dating back at least 2,000 years, was a people named the Guanches, conquered by the Spanish in the late 15th century, who left some evidence of huts, pottery and wooden and obsidian tools and to whom the mountain had religious significance. To the Greco-Roman world it was the zero-point of their coordinate system. In the Renaissance it was thought to be the world's highest mountain and became an important reference point in transatlantic navigation which brought it much scientific attention. A 1664 expedition from London was written up in the first number of the Royal Society's *Proceedings*. Toricelli's barometer was tested there, and vegetation layering with altitude was described there by von Humboldt in 1799. It became a literary and scientific icon and was much studied by eminent western European scientists, especially after von Buch's description of the islands in 1815 which initiated modern vulcanology.

LOCAL HUMAN POPULATION

The local people have traditionally gathered the mountain's natural resources, firewood and dry culm, snow, sulphur and pumice, wildflowers and coloured soils for ornament, pastured their flocks and hived their bees there in summer and till the mid 20th century, made charcoal. Some of these occupations still occur, under regulation. Only three people live within the Park at present.

VISITORS AND VISITOR FACILITIES

In the last decades of the 19th Century Teide became one of the first nature geo-tourism centers with the construction of the Altavista Refuge at 3,270m specifically for ecotourism (now reconstructed, with 60 beds). Now, there are about 3.5 million tourists a year, making it one of the most visited volcanoes in the world. Visitors are channelled through two educational programs: a Regulated Education program for scientists and a Public Use program served by a network of facilities and equipment, with guided tours for the public, educational lectures and school tours, training tours and environmental workshops. There are visitors' centres at the Parador de Las Cañadas del Teide hotel (Cañada Blanca) and at El Portillo which has a botanic garden of endemic plants and a fire and first aid station. There are also mountain refuges, several restaurants, a cable car with stations at 2,350m and 3,550m and a communications relay station. In addition to hiking, there are camping, climbing, caving and bike tours. The Park Service runs the educational Muñoz Nature Activities center just outside the Park.

SCIENTIFIC RESEARCH AND FACILITIES

Following the early work of von Humboldt, von Buch and Lyell, an enormous amount of vulcanological research has been done and is still carried out - into volcanic seismic activity, earthquakes, palaeomagnetism and the collection of geo-chronological data. It is a natural laboratory for atmospheric studies which started in the 1850s with Piazzi Smyth's observations, followed more recently by studies of ultraviolet light and the structure of trade winds. Due to the clarity of its atmosphere, it remains important for astronomy. The endemic flora over the 2,000m elevational range was inventoried and primary ecological succession on the various lava flows in the extreme conditions has been monitored, extended by the 2,000m elevational range. The exceptional meteorological conditions of Las Cañadas led to the building of the Izana Astrophysical Laboratory at 2,400m by the Astrophysics Institute of the Canary Islands. It is a well-known nucleus for solar physical research, a principal North Atlantic centre

for the measurement and monitoring of global atmospheric pollution and part of the Global Climate Change Monitoring Network.

MANAGEMENT

From 2007 on, the site will be managed by the Autonomous Community of the Canary Islands. The appropriate organisations will classify all land in the area as non-buildable land under special protection, thus prohibiting all construction, except when the Patronage certifies it in the public interest. The harvesting of mountain resources is allowed under regulation, but the managing authorities will emplace measures to protect the terrain, flora, fauna, landscape, natural forests and waters and to limit the introduction of exotic animal or plants. Tourist numbers especially on the summit trails are limited and controlled. Under the 2002-2010 Management Plan, four management zones are confirmed: Reserve (6.7% of the area) for total protection mainly of the escarpment and craters, Restricted Use (68.3%) - full public but no unauthorised activity, vehicles or buildings, Moderate Use (24.7%) - more intensive public use permitted, and Special Use (0.3%) for service structures. Beyond the basic objectives of facilitating and regulating protection, research, recreation and public education, the plan aims to promote sustainable development programs to benefit the surrounding communities. Regular monitoring is done of threatened and critical plant populations, plant community coverage, mouflons, rabbits and introduced species, visitor numbers and requests for research.

MANAGEMENT CONSTRAINTS

The two main present threats to the Park are invasion by exotic species and the heavy pressure of tourism. 30 plant species, mostly associated with human waste, have been eradicated, and some areas fenced off from grazing animals. Of these, the mouflon is to be eradicated and the rabbits controlled. There are several Park-related structures which will remain but some houses will be demolished. Volcanic seismic activity is constantly monitored, and fire surveillance and fighters are on constant guard. The high visitor numbers are to be met by providing further visitor services and increasing controls in the field.

COMPARISON WITH SIMILAR SITES

The main bases for comparing the site with similar existing World Heritage sites on the grounds of outstanding universal value are:

- (vii) The severe beauty of the varied, multicolored and well-preserved volcanic landscapes, the clear atmosphere with the peak rising high above clouds and the island, and the mosaic of its uncommon and altitude-adapted summit flora;
- (viii) The importance of the geological processes seen in the abundant, varied and long-studied evidence, notably in the huge caldera, of the past explosive and effusive eruptions of a slow developing volcano over a static plate, which is of value to geologic research; the utility to science of its unpolluted location as a centre for research into solar physics, astro-physics and the measurement and monitoring of global atmospheric pollution and climatic change.

There is no other volcano in its biogeographic region although the undesignated Pico do Pico (2,342m high) in the Azores and Mt. Halla (1,950m) off South Korea have similarities. Of the existing 23 World Heritage volcanic sites, it is most comparable with the oceanic serial island shield volcanoes of Hawaii and the Galapagos, both of which formed over a static hot spot and have as many exceptional volcanic features as Teide though the large Galapagos islands group is much richer in endemic plants. The closely comparable Hawaiian volcanoes have a wide range of volcanic forms. But Teide's lava is more felsic in composition and is quiescent, complementing the other very active basaltic sites. A secondary factor is the high degree of endemism of its flora and its great number of endemic invertebrates, including troglobitic fauna.

There are four shield volcanoes among the twelve volcanic island World Heritage sites: 2,745m snowbound Mt Mawson on Heard Island, and the Subantarctic islands off southern New Zealand (705m high) are climatically not very comparable, the subtropical Lord Howe Island seamount group off Australia (875m high) and cool temperate Inaccessible Island in the south Atlantic (600m high) have similarities but both are dormant and much eroded. Two nominated sites, the Prince Edward Islands off South Africa and Mt.Halla off South Korea are a quietly active shield volcanoes. Most of the other sites are associated with convergent plate subduction, occurring at and not between plate boundaries. These include the Aeolian Islands off Italy, an active historical textbook of vulcanology for 200 years

(875m), Rakata on Krakatoa island (813m) which is too continuously active to be comparable; Morne Trois Pitons (1.220m) in the large island of Dominica and the stump-like peaks of the Pitons on St. Lucia (777m) are both centres of hydrothermic activity rather than volcanoes. MacQuarie Island off Australia is a low extruded ocean ridge (433m), St Kilda is an eroded rock. The caldera of Ngorongoro is vast but much weathered. Tectonic volcanoes too clustered in location to be closely comparable to Teide are the high shield volcanoes among the active peaks of glaciated Kamchatka, and some of the long-dormant forested ranges of Australia's Central Eastern Rainforest. Not of shield origin are Tongariro in New Zealand, Sangay in Ecuador, the African Mounts Kahuzi, Biega, Nyiragongo and Nyamuragira in Virunga National Park; and the grand solitary massifs of Mounts Kenya and Kilimanjaro.

There appear to be no comparable high volcanic World Heritage sites on oceanic islands, considering its rich, explicit and well studied display of volcanic history as a shield volcano, together with a huge caldera and rare flora and fauna, except for its counterpart in the Pacific. It is accessible, beautiful, a serious centre of scientific research, and likely to be well maintained despite high visitation.

STAFF

There is a staff of 11 permanent and 12 contracted workers: 4 technicians, 7 office workers, 6 park rangers and environmental agents, 3 maintenance and 3 cleaners. Private contractors supplement this staff with 114 other workers in the same fields, especially for cleaning and maintenance. The permanent staff receive both professional and work training.

BUDGET

From the national Ministry of the Environment via the Autonomous Regional authority. In 2005 this sum was E4,880,882 (US\$6,424,900). Specific Park projects are also separately funded.

LOCAL ADDRESSES

Teide National Park, nº 5, 4º piso. 38002 Santa Cruz de Tenerife, Canary Islands, Spain.
web: <http://www.mma.es/parques/lared/teide/index.htm>

Comunidad Autónoma de Canarias, Viceconsejería de Medio Ambiente, Avenida de Anaga, nº 35, Edificio de Usos Múltiples I, planta 6ª, 38071 Santa Cruz de Tenerife

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