
WORLD HERITAGE NOMINATION - IUCN TECHNICAL EVALUATION

ISCHIGUALASTO PROVINCIAL PARK-TALAMPAYA NATIONAL PARK
(ARGENTINA)

1. DOCUMENTATION

- i) **WCMC Data Sheet:** (9 references)
- ii) **Additional literature consulted:** 1998. **Monograph on Ecosystems and Palaeontology of Ischigualasto Natural Park.** Argentina; 2000. **Criteria and Actions for Co-operative Management of the Ischigualasto-Talampaya Parks;** Sill, W. 2000. **Comparison of the world's Triassic vertebrate localities - a synopsis.** Unpublished Ms., 2pp; Olsen, P. 2000. **The Triassic World.** Columbia University; Wells, R. T. 1996. Earth's Geological History – a contextual framework for assessment of World Heritage fossil site nominations in **Global Theme Study of World Heritage Natural Sites,** IUCN, Switzerland, 43pp.
- iii) **Consultations:** Specialists from the National Secretariat of Tourism, University of San Juan, Museum of Natural Sciences, staff of Ischigualasto Provincial Park, Argentine National Parks Administration, University of La Rioja, local government and authorities.
- iv) **Field visit:** Paul Dingwall. March, 2000.

2. SUMMARY OF NATURAL VALUES

The nominated site comprises two contiguous parks: Ischigualasto Provincial Park (Category II, IUCN) created in 1971, and Talampaya National Park (Category II, IUCN), originally established as a provincial park in 1975 but reclassified as a national park in 1997. Located respectively in the provinces of San Juan and La Rioja, in the desert region on the western border of the Sierras Pampeanas of central Argentina, the parks encompass a single geographical unit of 275,369ha (see maps 1 and 2). The parks were established to protect geological formations of the Triassic Period, and associated landscapes, scenery and biota.

The site constitutes almost the entire sedimentary Ischigualasto-Villa Union Triassic Basin, consisting of continental sediments deposited during the entire Triassic Period of geological time, from approximately 245 to 208 million years ago. There are six geological formations, the earliest of which are the red sandstones of the Talampaya and Tarjados Formations, exposed as 200m-high cliffs in Talampaya NP. The Ischichuca-Chenares Formation is composed of lake beds and beach deposits, the latter containing fossils of an ancestral group of mammals, termed Therapsida, including animals ranging in size from a bear to a small elephant. Also present are fossils of a group termed Archosauria - animals that are ancestors of the dinosaurs (and by extension birds), crocodiles and lizards. The Los Rastros Formation, cyclic sediments deposited in rift valleys during the earliest breakup of the Gondwana supercontinent, has a wealth of fossil plants, especially ferns such as *Cladophlebis*. The Ischigualasto Formation, composed of strikingly white floodplain sediments, is immensely rich in fossil specimens of reptiles, amphibians, therapsids and plants. The vertebrate specimens contain the earliest primitive dinosaurs, *Eoraptor*, and its more advanced contemporary *Herrerasaurus*. Finally, the Los Colorados Formation comprises classic red sandstones with an abundance of dinosaur fossils, almost entirely archosaurs and including large herbivorous and carnivorous dinosaurs, primitive true crocodiles, and primitive true mammals.

Ischigualasto-Talampaya is of outstanding scientific importance as the only known area in the world that contains a complete sequence of continental sediments with abundant fossil fauna and flora for the Triassic Period of geological history. This period is very significant for understanding the evolution of life on earth, as it represents the origin of both mammals and dinosaurs. Further, it offers the prospect of resolving one of the greatest enigmas of palaeontology - the rise to dominance of the dinosaurs and suppression of mammalian evolution over a period of 150 million years. The rich diversity of fossils includes some 56 known genera of vertebrates (species

numbers yet to be determined), and at least 100 species of plants. Together with the geological strata, the fossils provide a unique window for viewing Triassic palaeoenvironments.

Additional to the scientific importance of the site are its scenic landscapes and features of great aesthetic and cultural value, including 1500 year-old petroglyphs. Outstanding among these are the 200m-high red sandstone cliffs of the Talampaya Fm. in Talampaya NP. In Ischigualasto Provincial Park, the white and multicoloured sediments of the Ischigualasto Fm. create a stark, lunar-like landscape entitled “El Valle de la Luna - the Valley of the Moon”.

The site has typical El Monte (desert) vegetation, which is sparse and characterised by xeric shrubs and cactus, with mesquite and quebracho trees. Among the 172 species of higher plants recorded are six considered in need of special protection because they are endemic and/or rare. Among the vertebrates, those considered endangered or vulnerable include five species of mammals, three species of birds and three species of reptiles.

3. COMPARISON WITH OTHER GEOLOGICAL SITES

The Triassic Period opens the Mesozoic Era of geological time, known as the “Age of Dinosaurs”. Comprising three major stages, it was a critical period in the evolution of life on earth because all of the groups of tetrapods (4-legged animals) evolved by its end (Olsen, 2000). Continental Triassic sediments like those in Ischigualasto-Talampaya are found at several world localities, but they are generally limited in extent and not rich in fossils (Sill, 2000). Germany, Switzerland, Italy and the U.K. have Early and Late Triassic exposures. Russia’s Ural Mountains have an important Early Triassic site, and there are others in China and India, the latter having the continent’s only well known Late Triassic fossils. The Karoo of southern Africa is a major reference for the Early Triassic, while Algeria, Libya and Morocco have some Late Triassic sites. In North America, Early Triassic vertebrates are found only in scattered localities in the southwest, and there are extensive Late Triassic sediments in eastern USA extending into Canada, and in the red beds of the southwest, notably in the Chinle Fm. of Arizona. In Antarctica Early and Late Triassic sites are known, principally bearing fossil plants with some vertebrates.

Unlike any other place in the world, the Argentine Ischigualasto-Talampaya site has seven sequential Triassic formations representing the entire Triassic Period. The Middle Triassic here is undoubtedly the best representative of that age currently known anywhere.

Few Triassic sites are protected. Only two in the United States are protected as national parks or monuments: the Petrified Forest NP in Arizona, which has several plant and animal groups represented, but is limited to the Late Triassic; and Dinosaur NM in Utah, with its outstanding dinosaur assemblage of great scientific importance, which is mostly Late Jurassic in age. Among existing World Heritage sites, the one most noted for its fossil dinosaurs is Canada’s Dinosaur Provincial Park but it is much younger than Ischigualasto-Talampaya, dating from the Late Cretaceous only 75 million years ago. Of the other important palaeontological sites on the World Heritage List - Australian Fossil Sites, Messel and Miguasha - none is Triassic in age. Wells (1996), in providing an indicative representative list of the world’s fossil sites with potential for World Heritage status, selects Ischigualasto for its exceptional Mid-Late Triassic record of early dinosaurs.

Attached is an Annex which documents the qualities of the nominated site against the IUCN criteria for establishing the universal value of fossil sites (Wells, 1996). The results provide a good demonstration of the World Heritage significance of the site.

4. INTEGRITY

4.1 Boundaries

The boundaries of the nominated site encompass the surface expression of the entire Triassic age Ischigualasto-Villa Union sedimentary basin, thus including all key fossiliferous strata within the protected area. It is a holistic geological site containing an entire geosystem with all interrelated components - continuous sequences of rock outcrops, erosional forms, outwash areas and depositional features. Although most of the boundaries follow straight lines rather than topographic contours, this is not a problem given the poor definition of catchments in the desert landscape.

4.2 Management

The nominated site is public land with strong legal protection. Although about 20% of the area is managed under Provincial law, this provides statutory protection equivalent to the national park. There is no formally approved management plan for the site, but the plan for Talampaya NP is in the final stages of public consultation, and for Ischigualasto there is a comprehensive resource management document providing the basis for a future plan. The national and provincial authorities are establishing a single cooperative management regime for the site. Already, there is a documented agreement specifying common management objectives, planning processes and zoning procedures, and integrated action in respect of staff training, tourism management, control measures, research, institutional supervision and support, among others. Oversight of joint management will be provided by a standing Coordinating Committee, assisted by a single Technical Advisory Group representative of key local scientific institutions, provincial agencies and non-governmental conservation organisations. This should ensure the application of uniform management policies, programmes and standards across the entire site.

Management resources are limited and park infrastructure is only rudimentary at present. However, the need for improvement is well recognised by the administering agencies, and appropriate provisions are included in the draft management plan. There is a commitment to implement the management plan by the key authorities at all levels - park, municipal, provincial and national. Among the priority management requirements are:

- increased staffing levels above the existing complement at Ischigualasto of one ranger and eight certified guides, and at Talampaya of two rangers and 17 unofficial guides;
- more vehicles for park maintenance and visitor guiding purposes;
- improved administration and visitor facilities, such as interpretation centres, rangers' accommodation, toilets, stores, restaurants, camping facilities and walking trails; and
- increased funding.

The parks are zoned appropriately for protection and use, and currently there are no significant threats to the values protected in the nominated site. Impacts from tourist use, unauthorised grazing and exotic pests are minimal and are within acceptable levels that can be sustained without serious loss of park values. Research and collection of specimens are strictly controlled, and there are heavy penalties for illegal collecting and poaching, which appear to be minimal. The parks are very well served by scientific and technical advice for underpinning their research, education, training and interpretive programmes. A feature at the site is the strong interaction between the parks and the surrounding communities.

Overall, the nominated site adequately satisfies all key conditions of integrity.

5. ADDITIONAL COMMENTS

No additional comments.

6. APPLICATION OF WORLD HERITAGE NATURAL CRITERIA

Ischigualasto-Talampaya is nominated in accordance with World Heritage natural criteria (i), (iii) and (iv).

Criterion (i): Earth's history and geological features

Unlike any other place on earth, Ischigualasto-Talampaya is made up of a complete sequence of fossiliferous continental sediments representing the entire Triassic Period of geological history. As such, it is one of the most important palaeontological sites in the world, and of great scientific and conservation value. This is the fundamental basis of its claim to outstanding universal value in representing a major stage of earth's geological evolution.

In the sediments of Ischigualasto-Talampaya are found fossil-bearing strata that document the transition from Early Triassic mammalian ancestors to the age of dinosaur dominance in the Late Triassic. No other place in the world has fossils that can compare to those preserved in the Chanares, Los Rastros and Ischigualasto Formations in these parks for revealing the evolution of vertebrate life and the nature of palaeoenvironments in the Triassic

Period, which ushered in the Age of Dinosaurs over the next 150 million years. Although there are Triassic sites on other continents, they are generally small and scattered with limited fossil abundance, and they represent only a restricted period of the 45 million years of Triassic time. IUCN considers that the nominated site meets this criterion.

Criterion (iii): Superlative natural phenomena or natural beauty and aesthetic importance

Ischigualasto-Talampaya contains some spectacular scenery. The many canyons in Talampaya NP are bounded by towering 200m high bright red-coloured walls, some eroded into cathedral-like spires, while in Ischigualasto PP stratified rock formations are carved by rain and wind into erosional shapes, protruding conspicuously above a stark, ash-coloured landscape colloquially referred to as “El Valle de la Luna- the Valley of the Moon”. Also the rock formations and landscapes of the parks have become visual icons for the region and the country, ranged alongside the images of Argentina’s other World Heritage sites - the peaks and glaciers of Los Glaciares and the cataracts of Iguazu Falls. However, when compared to other World Heritage sites inscribed under this criterion, the nominated site does not rank high. IUCN does not consider that the nominated site meets this criterion.

Criterion (iv): Biodiversity and threatened species

The biodiversity values of the site are not well documented in the nomination, and the claim made against this criterion is, therefore, not established. The plants and wildlife of the parks are still not completely known. The vegetation has been broadly mapped throughout, and an inventory of the plants in Ischigualasto Provincial Park only recently conducted. On the positive side, the natural habitats of the site are important because they are largely in an unmodified state. The site is large (about three quarters of a million hectares) and protects a very substantial representative piece of El Monte(desert) ecosystems - certainly more than any of the several other protected areas in the desert region. On the negative side, the biota and habitats here are typical of the region rather than outstanding and, apart from three plants being reported as endemics, they lack special features. Nor is the vegetation here of a type that is unique in the world - being essentially replicated in the great Sonoran Desert of southwestern USA. IUCN does not consider that the nominated site meets this criterion.

7. RECOMMENDATION

The Bureau recommended to the Committee to **inscribe** Ischigualasto Provincial Park and Talampaya National Park on the World Heritage List under natural criterion (i). The Bureau noted that the site contains a complete sequence of fossiliferous continental sediments representing the entire Triassic Period (45 million years) of geological history. No other place in the world has a fossil record comparable to that of Ischigualasto-Talampaya which reveals the evolution of vertebrate life and the nature of palaeoenvironments in the Triassic Period.

The Bureau suggested that the State Party, along with the relevant Provincial authorities, proceeds as soon as possible with the establishment of a single cooperative management regime, including completion of an integrated management plan and provision of adequate human and financial resources to implement effective management.

ANNEX I: EVALUATION CHECKLIST FOR FOSSIL SITES

Coverage of an extended geological time period

Ischigualasto-Talampaya has fossils covering virtually all of the Triassic Period, i.e. approximately 45 million years from 245 to 208 million years B.P. It is the only known area containing a complete sequence of fossiliferous continental sediments for the Triassic, so is of immense scientific importance.

Rich species diversity

The site provides a wide variety of both plant and vertebrate fossils. At least 56 genera of vertebrates are known, including fish, amphibians and a great variety of reptiles and direct mammalian ancestors. Some 100 species of fossil plants have been identified. Palynological (pollen) studies are incomplete but will increase the known diversity of the ancient flora. Three species of fossil freshwater invertebrates have been identified.

Uniquely representative of a geological time period

The nominated site is unique in presenting a complete sequence of continental fossil bearing strata from the Triassic. Other sites, especially in South Africa, Russia and the USA, have representative Triassic faunas of the Early and/or Late Triassic, but none of them has extensive Middle Triassic specimens. Moreover, none of them can document the transition from Therapsida (ancestral mammals) in the Early Triassic to the dominant dinosaur fauna of the Late Triassic.

Contribution to understanding life on earth

The nominated site is one of the principal locations for studies on the origins of dinosaurs, and on the early faunal transition that was eventually to lead to dominance of dinosaurs in all the earth's ecological niches on land, sea and in the air, a most significant faunal transition in the history of life on earth. The abundance of fossil biota enables comprehensive interpretation of palaeoenvironments and landforming processes that existed more than 200 million years ago.

Prospects for ongoing discoveries

Literally thousands of specimens have been recovered from the sediments of the parks, and many fossils are added to the collections annually. There are excellent prospects for further significant discoveries of fossil flora and fauna at the site. Due to the very rugged terrain, more than half of the site has not yet been thoroughly explored.

International level of interest

The fossil plants and vertebrates of Ischigualasto-Talampaya are of great significance to the sciences of palaeontology and evolutionary biology. The site is of international renown in scientific circles as a principal location for in-situ study of the world's earliest dinosaurs. Palaeontological research has been conducted here for 70 years, and most of the 627 scientific papers related to the area are published in international journals. Specimens from the site are of high quality and are in great demand for research and display, such as for the special exhibit on the world's oldest dinosaurs held at the Texas Memorial Museum in 1997.

Associated features of natural value

Among the other notable natural features are spectacularly scenic rock formations and landscapes, protected wildlife and endemic plants characteristic of "El Monte" (desert) vegetation.

State of preservation of specimens

The site is remarkable for the recovery of whole skeletons of vertebrate animals, enabling detailed study of the physiology and behaviour of the earliest dinosaurs and proto-mammals. Studies of jaw structures, for example, have revealed feeding mechanisms, skull shapes record the evolution of forward-looking eyes, and limb anatomy displays the early development of bipedalism and upright stance among the dinosaurs.

Curation, study and display of site and fossils

Specimens from the site, both palaeontological and biological, are fully catalogued and curated by the Museum of Natural Sciences at the University of San Juan, which is the principal research centre for the parks. The senior researcher has worked in the parks for more than 30 years, is an expert on the geology of the Triassic and one of the world's leading vertebrate palaeontologists. Researchers from the University of La Rioja are also very active at the site. While specimens are freely available for study, strict laws control all collecting of specimens, and all research is supervised by the University of San Juan. There are displays of the specimens at the museum, where a major new display of fossils and Triassic palaeoenvironments is planned. Exhibits at the park visitor interpretive centres are rudimentary but will be improved as resources allow. There are some in-situ displays of fossils in the parks. Rangers or guides accompany all visitors to the parks.



**Map 1: Location Map – Ischigualasto Provincial Park–
Talampaya National Park**



Map 2: Site Map – Ischigualasto Provincial Park–Talampaya National Park