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TONGARIRO NATIONAL PARK NEW ZEALAND

In 1993 Tongariro became the first property to be inscribed on the World Heritage List as a Cultural Landscape. The mountains at the heart of the Park have cultural and religious significance for the Maori people and symbolize the spiritual links between this community and its environment. The Park has active and extinct volcanoes, a wide range of ecosystems from the once nationwide Podocarp-broadleaf rainforest to subalpine meadows and some spectacular landscapes.

COUNTRY

New Zealand

NAME

Tongariro National Park

MIXED NATURAL & CULTURAL WORLD HERITAGE SERIAL SITE

1988: Inscribed on the World Heritage List under Natural Criteria vii and viii (UNESCO, 1998)

1993: Extended as a Cultural Landscape under Cultural Criterion vi.

STATEMENT OF OUTSTANDING UNIVERSAL VALUE [pending]

IUCN MANAGEMENT CATEGORY

II National Park

BIOGEOGRAPHICAL PROVINCE

Neozealandia (7.01.02)

GEOGRAPHICAL LOCATION

A mountain massif in the south centre of North Island almost midway between Auckland and Wellington. A small outlier, 3 km north of the main park, separated from it by Lake Rotoaira lies just south-southwest of the town of Turangi and Lake Taupo. The Park is bounded on the west by a main railway and on the north by a main road, lying between 38° 58' to 39° 35' S and 175° 22' to 175° 48' E.

DATES AND HISTORY OF ESTABLISHMENT

1887: 2,630ha of the central volcanic area gifted by deed to the government by Paramount Chief TeHeuheu Tukino of the Ngati Tuwharetoa people;

1894: The summits of Tongariro, Ngauruhoe and Ruapehu became the nation's first National Park; gazetted in 1907 (25,213ha);

1922: The land area increased to 58,680 ha under the Tongariro National Park Act; between 1925 and 1980 the Park area was increased several times;

1975: The outlying Pihanga Scenic Reserve added (5,129ha);

1980: The National Park Act passed, providing the Park's legal and administrative structure (DLS, 1986);

1993: Extended as the first UNESCO Cultural Landscape.

LAND TENURE

Government, in the Tongariro and Wanganui regions. Administered by the Tongariro - Taupo Conservancy of the Department of Conservation.

AREA

79,596ha: Tongariro National Park 74,467ha + Pihanga Scenic Reserve 5,129ha. It is adjoined on the east by the Kaimanawa Forest Park (76,684ha).

ALTITUDE

500m to 2,797m (Tehurangi peak of Mt. Ruapehu).

PHYSICAL FEATURES

The Park encircles the Ruapehu-Ngauruhoe-Tongariro mountain massif and includes the Mount Pihanga - Mount Kakaramea range with Lake Rotopounamu, to the northeast. It lies at the southern end of a discontinuous chain of volcanoes which extends north-east 2,500km into the Pacific Ocean, overlying the subduction zone of the Pacific Ocean plate beneath the Indian-Australian continental plate. The Park's volcanoes are predominantly andesitic in composition, and fall into two groups. The northern group of Pihanga, Kakaramea and Tihia are volcanoes with associated vents, domes, cones and craters which extend 10km north-west to south-east and have not been active for between 20,000 and 230,000 years. Glacial activity 100,000-14,000 years ago rounded its profiles. The southern group is currently active and comprises the three great volcanoes of central North Island in a range which extends about 20km by 10km wide along a south-west to north-east axis: Tongariro (1,968m), Ngauruhoe (2,290m) and Ruapehu (2,797m), which is the highest mountain on North Island. Much of the rainshadowed eastern side is barren.

The Tongariro volcanic complex comprises recent cones, craters, explosion pits, lava flows and lakes superimposed on older volcanic features. Two kilometres south lies Mount Ngauruhoe, a perfect 2,290m composite andesite cone of interleaved pyroclastic material and lava. Fumaroles in the summit crater frequently discharge hot gas and steam, and the cone, which may be as little as 2,500 years old, is still building into a striking symmetrical peak. Violent ash eruptions usually occur at nine year intervals though strombolian lava fountaining occurred in 1954, creating a 60m high cone on the western side of the 400m-diameter multiple crater. Its last eruption was in 1975. Seven explosion craters formed by violent contact between rising magma and groundwater, lie directly between Mount Ngauruhoe and Mount Ruapehu to the south. The largest two now constitute the Upper and Lower Tama lakes.

The south-east of the Park is dominated by Mount Ruapehu, which is a 350 ha massif of five peaks over 2,500m, cones, ridges, active and inactive vents. Volcanic activity began approximately 500,000 years ago and tephra deposits indicate a peak of activity 10,000-14,000 years ago. The current active vent of Ruapehu lies at 2,550m beneath Crater Lake which in 1995-6 disappeared but has now re-formed (Hancox *et al.*, 1997). This is 500m wide, more than 180m deep, has a temperature of 20-40°C, a pH of 0.8-1.5 and is rich in dissolved minerals. The upper reaches of the Whangaehu outflow are consequently devoid of fish and most invertebrates. Minor hydrothermal eruptions in the lake are not uncommon, causing *lahars*, destructive mudflows in which water- and mud-borne debris flows downstream. Major *lahars* occurred in June 1969, April 1975 and 1995-96 (Williams, 1985).

Erosion of deposits by ice and the water of numerous springs, including thermal springs, is extensive. The steep upper slopes of the major volcanoes comprise lava flows interbedded with ash and coarser volcanic debris, while on gentler slopes both lava and mudflows are covered by ash. Freeze-thaw and freeze-heave action and the major radial drainage systems feeding the Tongariro, Wanganui and Whangaehu rivers have rapidly eroded the unconsolidated ash and rock on Tongariro and Ruapehu. Extensive glaciation up to 14,700 years ago cut into both mountains, and glacial valleys with terminal and lateral moraines remain. Glaciers are currently restricted to Mount Ruapehu. There are seven which, after several decades of retreat, all are less than 1km long.

The Park contains other extinct volcanoes, laval and glacial deposits and springs. Marine mudstone and sandstone of Miocene-Pliocene origin form two hilly areas in the west. Rhyolitic pumice deposits, a legacy of the very powerful Taupo eruption about 1,800 years ago and frequently more than 30cm deep, occur in the northern and eastern two-thirds of the park. This eruption destroyed much of the forest cover of the Park. Desiccating westerly and southerly winds have inhibited vegetation development east of Mount Ruapehu and a largely barren desert-like environment of dark reddish-

brown sand and ash has formed (Johnson, 1976). Soils are generally weathered andesitic ash: dark sandy loams and to the west, loamy sands; drainage is frequently poor. Above 1,100m, ash, gravel and unconsolidated stonefields are predominant. With the exception of some recent alluvial flats, soil fertility throughout the Park is low (Atkinson, 1981).

CLIMATE

The north-east to south-west orientation of the mountains results in most precipitation from the prevailing westerly winds falling on the windward side of the Park which causes semi-arid conditions in the rain-shadowed land to the east. The precipitation is unpredictable. The north and west has an annual rainfall of 1,800-3,500mm, the south and east, only about 1,100mm per annum. Above about 1,200m annual precipitation probably exceeds 3500mm. Winter snow extends to about 1,500m. The 1931-1960 mean annual temperatures were between 9.6°C and 10.1°C at 600m and 7.1°C at 1,100m. The absolute minimum and maximum temperatures recorded are -10°C and 25°C, respectively. Whakapapa has only 120 days of annual growing season. Ground frosts occur throughout the year, and above 2,000m there are permanent snowfields and ice (Atkinson, 1981).

VEGETATION

Some 80,000 ha of the Podocarp/hardwood forest and has been logged in the last 60 years, severely reducing the original forest cover. The Park's present-day vegetation is influenced by altitude, rainfall distribution, the occurrence of Taupo pumice, burning, drainage and erosion as well as substrate instability and grazing (Atkinson, 1981). The diverse habitats range from remnants of rain forest through deciduous forests, scrubland, tussock grassland and subalpine vegetation to nearly barren icefields. A number of other small formations exist, including shrub, grass, bracken, sedge, rush and moss communities. Lodgepole pine *Pinus contorta* and broom *Cytisus scoparius* are pervasive invaders. A species list and vegetation map is given in Atkinson (1981).

From the lowest altitudes to 1,000m in the west and north, some 3,000 ha of once nationwide mixed Podocarp-broadleaf rain forest occurs, dominated by *Podocarpus hallii*, *P. dacrydioides*, *Weinmannia racemosa*, *Libocedrus bidwillii*, and with it numerous epiphytic ferns, orchids and fungi. Higher up, beech forest occurs with red beech *Nothofagus fusca*, silver beech *N. menziesii* and mountain beech *N. solandri* var. *cliffortioides* in pure stands totalling over 5,000ha, or with *L. bidwillii* from 750m to 1,530m covering 12,730ha. Widespread death of mature beech has occurred on Ruapehu, possibly due to the pathogenic fungus *Sporothrix* sp., spread by the pinhole beetle *Platypus* sp. but regeneration is occurring. Scrublands featuring the tea trees *Leptospermum ericoides*, *L. scoparium*, *Phyllocladus aspleniifolius*, *Dracophyllum longifolium*, *Rhacomitrium lanuginosum*, introduced heather *Calluna vulgaris*, dwarf beech, podocarps and others, in a variety of associations, cover some 9,500ha. Tussock shrubland and tussockland cover extensive areas in the north-west and around the Mount Ruapehu massif at about 1,200-1,500m.

Dominant species include New Zealand red tussock grass *Chionochloa rubra*, *inanga*, *Dracophyllum longifolium*, *D. recurvum*, the sedge *Empodisma minus*, bogrush *Schoenus pauciflorus*, heather and the grasses *Festuca novaezealandiae* and *Poa colensoi*. These cover some 15,000ha and are generally the highest communities with complete ground cover. The highest levels in the Park are dominated by gravelfields and stonefields, which are very unstable and characterised by cycles of vegetation build-up and breakdown. Typical species, covering about 16,500ha, are *Dracophyllum recurvum*, *Podocarpus nivalis*, *Gaultheria colensoi*, *Rytidosperma setifolium*, *P. colensoi* and *Raoulia albosericea*, some of which occur in the Rangipo desert in the east. An additional 10,350ha, from 1,700m to 2,020m, supports isolated individuals of *Parahebe* spp., gentian *Gentiana gellidifolia*, buttercup and others, but above 2,000m the only obvious plants are crustose lichens.

FAUNA

Native mammals include the New Zealand lesser short-tailed and long-tailed bats *Mystacina tuberculata* (VU) and *Chalinolobus tuberculatus* (VU), but the native vertebrate fauna is restricted mainly to birds. More than 56 bird species have been recorded in the Park including northern brown kiwi *Apteryx mantelli* (EN), blue duck *Hymenolaimus malacorhynchus* (EN), New Zealand falcon *Falco novaeseelandiae*, banded dotterel *Charadrius bicinctus*, kaka *Nestor meridionalis* (EN) and North Island fern bird *Bowdleria punctata vealeae* (DLS, 1986; Johnson, 1976). The native fauna has been seriously depleted by species introduced prior to 1922. These include rat *Rattus rattus*, stoat *Mustela erminea*, ferret *M. furo*, weasel *M. nivalis*, and cat *Felis catus* as predators, and herbivores such as brush-tailed possum *Trichosurus vulpecula*, European hare *Lepus europaeus*, rabbit *Oryctolagus cuniculus*, red deer *Cervus elaphus* and goat *Capra hircus*. Although much effort has been devoted to

eradicating exotics, they continue to threaten the native flora and fauna (Atkinson, 1981; Johnson, 1976).

CONSERVATION VALUE

The Park contains striking active and extinct volcanoes, a diverse range of ecosystems and is a major economic and recreational resource. Its central mountains have religious and cultural significance to the Maori people as symbols of the spiritual links between their community and the environment. The Park lies within a Conservation International-designated Conservation Hotspot, a WWF Global 200 Eco-region and in one of the world's Endemic Bird Areas. It was also the first World Heritage site to be designated a Cultural Landscape (DoC, 1990a).

CULTURAL HERITAGE

The area has been occupied by Maoris since they first arrived from Polynesia and their mythology identifies the mountains in the Park with *Tupuna* or god-like ancestors. Until the land was given to the nation in 1887, the area was occupied by the Tuwharetoa tribe. Early European attempts to settle in the area and introduce sheep farming started in 1856, but this ended in the 1920s (DoC & TNHS, 1998).

LOCAL HUMAN POPULATION

With the exception of Whakapapa village, which largely comprises tourist facilities, there are no permanent settlements within the Park. Its summer population of 150 increases to 400 in winter. The village is the subject of Volume 3 of the current management plan (DoC, 1990c).

VISITORS AND VISITOR FACILITIES

The Park is the largest and only commercial ski-field on North Island and is New Zealand's most visited National Park. Annual visitors have increased from an estimated 90,000 in 1960 to 1,100,000 in 2001 (UNESCO, 2003). Overseas visitors, only 3% in the 1980s, are increasing, especially for mountain trail walking like the well-known Tongariro Crossing. Foot trails give access to several areas, including Mount Tongariro, and encircle both the Ngauruhoe and Ruapehu massifs. Major recreational activities include walking, climbing, hunting, fishing, and skiing, for which more than a dozen chair lifts and nine mountain huts are provided. The Park headquarters at Whakapapa has a visitors' information centre and guided walks are given. There is a second visitors' centre at Ohakune. Rural highways entirely surround the park and a number of roads and tracks enter it. Accommodation in over 50 private lodges is available at Whakapapa, Iwikau and Turoa villages and at several camp sites in the Park. There are two distinct peak seasons: skiing from July to late October and a mid-December to mid-February summer vacation period. More than 300,000 people a year use the Whakapapa skifield (Williams, 1985). Recreational use of helicopters and snowmobiles is banned.

SCIENTIFIC RESEARCH AND FACILITIES

The first comprehensive botanical survey was carried out in 1908 (Cockayne, 1908). A more recent survey was conducted between 1960 and 1966 (Atkinson, 1981) and a popular account of the plant ecology of the Park has been published (Gabites, 1986). Research has also been undertaken on climate, fauna, ecology, landscape development and the role of pathogenic fungi in the dieback of *Nothofagus* species. The Department of Scientific and Industrial Research, which has an observatory at Whakapapa Village, conducts regular geophysical, deformational and chemical studies on the volcanoes. In addition, seismic and magnetic activity and atmospheric shock waves are monitored continuously for eruption prediction. A summary of volcanic observations is compiled annually by the New Zealand Geological Survey and published in the New Zealand Volcanological Record. Bibliographies are given comprehensively in Turnbull (1979), also in DoC & TNHS, (1981), Atkinson (1981) and Williams (1985).

MANAGEMENT

The current Management Plan (DoC, 1990a, b and c), in three volumes, states the following two goals: to preserve and protect for present and future generations the outstanding natural scenery, the scientifically important features and the indigenous natural resources which combine to make Tongariro National Park a place of national and international significance; and to promote an understanding of and appreciation for nature and natural evolutionary processes and the cultural and historic values of the Park, by providing opportunities for visitors to enjoy the park in a manner consistent with national park principles.

Six subsidiary objectives are stated:

- First, to manage the Park so that the present comprehensive range of indigenous ecosystems and natural processes continues;
- Second, to recognise and maintain the cultural, spiritual and inspirational heritage of the Park's mountains, and to recognise the spiritual and cultural significance of the Park to the Maori people and to consult with and give full consideration to the views of the appropriate authorities;
- Third, to encourage such public use and enjoyment of the Park as is consistent with the preservation of its natural features and historic values;
- Fourth, to enhance, through the provision of facilities and services for the benefit of Park visitors, an appreciation and awareness of Park values and of environmental and historical conservation and cultural values;
- Fifth, to ensure that conflicts between competing uses of the natural features and facilities of the Park are minimised and to concentrate development as far as possible either outside the Park or in the proposed amenity areas;
- Sixth, to provide opportunities to meet recreational needs by carefully controlled development consistent with National Park principles.

Detailed management policies cover a wide range of topics in the broad categories of preservation, management, public use and development.

Volume 2 of the Management Plan covers ski-field management (DoC, 1990b). Volume 3 covers the management of Whakapapa village (DoC, 1990c). Tongariro National Park Management Plan is currently under review (DoC, 2002). In 2002 the Department of Conservation prepared a draft Tongariro/Taupo Conservation Management Strategy, a requirement of the Conservation Act of 1987. This document sets the direction for the Tongariro/Taupo Conservancy, including Tongariro National Park, for the next ten years. This does not replace the Tongariro National Park Management Plan, but gives recognition to it. The 1980 National Parks Act provides much of the protective, legal and administrative mechanisms for the Park, although other statutes, and therefore a number of agencies, totalling 23, also affect it. Maori interests are represented by the Paramount Chief of the Tuwharetoa tribe who has a permanent seat on the Tongariro/Taupo Conservancy. The Department of Conservation is the agency responsible for the management of natural and historic resources. Management decisions are made according to statutory responsibilities, with input from the New Zealand Conservation Authority and the Tongariro-Taupo Conservancy. Administration of the Park is the responsibility of the Regional Conservator at Turangi.

The Park is zoned into Natural Environment, two Wilderness zones, three Service Areas and some 18 sites of Unique Biological or Geological Interest (TNPB, 1979). Ski-field development has been restricted by zoning the alpine regions of Mount Ruapehu and the summits of Mounts Tongariro and Ngauruhoe as 'pristine areas'. Developments are prohibited above 1,500m in the Tongariro and Ngauruhoe area, and generally above 2,250m on Ruapehu. The boundaries of the Whakapapa and Turoa ski-fields are currently at 2,325m and 2,280m, respectively. An increase in the upper limit of the Whakapapa fields to 2,365m may be permitted if a full and favourable environmental impact assessment is carried out. The department has programs to reduce animal and weed pests (DoC, 1990a). But in general, pristine areas will be managed to avoid development and to conserve natural, cultural and historic values. Proposals for engineering work at Ruapehu Crater Lake to reduce the potentially destructive impact of an impending *lahar* were therefore rejected in favour of a warning system and a containing dyke along the river Whangaehu to reduce the risks to public safety (IUCN, 2002).

MANAGEMENT CONSTRAINTS

Extermination of introduced flora and fauna is a requirement of the National Parks Act 1980. However, given limited resources, control rather than eradication is the current management approach (DoC, 1990a). The relative paucity of vertebrates stems from the nation-wide problem of introduced species. Further, native flora have been reduced or eliminated by introduced herbivores such as red deer, possum and goats (Atkinson, 1981). Invasive lodgepole pine *Pinus contorta* threatened to convert native communities into forest and was a particular problem in the eastern Rangipo desert. but management measures have controlled and in some areas eradicated the pine. Nevertheless, the presence of seed sources in neighbouring commercial lodgepole pine plantations continues to pose a threat. Exotic heather has also become established in the Park and is a potential threat still under study (Johnson, 1976; Atkinson, 1981). Volcanic activity, and especially mudslides, can endanger both wildlife and visitors, and the Park has witnessed major natural disasters (Williams, 1985). A plan for a

barrier in anticipation of a *lahar* from the Mt Ruapehu crater lake was developed, but the engineering work was considered too intrusive to go forward. A *lahar* alarm and warning system was installed and precautions taken against wildfires. Monitoring of volcanic hazards is ongoing. Concern over the impact of ski-field development and associated infrastructure have been addressed in the management plan which constrains ski fields within specific zones and has detailed policies covering their operation (DoC, 1990c).

STAFF

Staff are not dedicated specifically to working with Tongariro National Park, but it is estimated that 35 full-time equivalents are involved in management (DoC, 2002).

BUDGET

Funding is not specifically allocated to Tongariro National Park but it was estimated that initial 1985 annual expenditure would be NZ\$3.5 million (\pm US\$2.275 million) of which the crown contribution was NZ\$1.3 million and fee revenues were to provide NZ\$2.2 million. Visitors to the Whakapapa ski-field in 1985 spent NZ\$7.7million within the region during the 11-week ski season, and the Park annually provides some NZ\$1 million to the local economy (IUCN, 1997). In 2002-3 revenue from the Park was NZ\$690,000 (US\$1.2million) and expenditure NZ\$1,080,000 (US\$1.9million) (UNESCO, 2003).

LOCAL ADDRESSES

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Regional Conservator, Tongariro-Taupo Conservancy, Department of Conservation, Private Bag, Turangi, New Zealand.

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DATE

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