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HENDERSON ISLAND UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND

Henderson Island in the southeastern Pacific Ocean is the world's only raised atoll where the ecology is essentially intact, having been little degraded because of its extreme isolation and rough terrain. Its fossil corals record changes in sea levels and the climate over half a million years and its isolation makes it an ideal site for studying the dynamics of island evolution and natural selection. It is notable for ten plants and four land birds endemic to the island and for its evidence of long past Polynesian occupation.

COUNTRY

United Kingdom of Great Britain and Northern Ireland

NAME

Henderson Island

NATURAL WORLD HERITAGE SITE

1988: Inscribed on the World Heritage List under Natural Criteria vii and x.

STATEMENT OF OUTSTANDING UNIVERSAL VALUE [pending]

IUCN MANAGEMENT CATEGORY

Unassigned

BIOGEOGRAPHICAL PROVINCE

Southeastern Polynesian (5.04.13)

GEOGRAPHICAL LOCATION

Henderson Island is one of the Pitcairn Islands archipelago in the southeastern Pacific, some 4,800 km equidistant from both Chile and New Zealand. It lies 200 km east-northeast of the largest island, Pitcairn, 200 km east of Oeno I. and 360 km west of Ducie I. The Chilean islands of Rapa Nui (Easter Island) and Sala y Gomez lie to the east. Located at 24°21'49"S by 128°18'55"W.

DATES AND HISTORY OF ESTABLISHMENT

Henderson Island is not a declared protected area, though its isolation ensures it *de facto* protection:

1971: Local Government Regulations Part IV provide for wildlife protection and fishery management; The Lands and Administration of Estates Ordinance applies restrictions on possession, occupation and transference of land;

2004: Management Plan for 2004-2009 published.

LAND TENURE

The state: as a Dependent Territory of the United Kingdom, the Pitcairn Island group is crown land. It is managed by the Pitcairn Island Council under the British High Commissioner to New Zealand who is Governor of Pitcairn.

AREA

Land area 3,700 ha

ALTITUDE

Sea level to 33m.

PHYSICAL FEATURES

The Pitcairn Islands are one of the remotest island groups in the south Pacific, with no major landmass within 4,800 km. Henderson Island is an uplifted coralline limestone platform 9.6 km long by 5.1 km wide. The surface is largely a plateau of reef rubble interspersed with areas of sharp coral pinnacles and with extremely rugged dissected karstic limestone round the edges. The central depression is the site of the lagoon which formed before the island rose. Freshwater only occurs on the north and northwest shores, dripping in a low cave, and as brackish springs below high tide level, of unmeasured flow and permanence. Soils are generally poorly developed. The best are developed from decayed vegetation under the plateau forest; they are poorest in the central depression, formed over fragments of fossil lagoon reef. Geologically the island is a reef-capped sea-mount of the *makatea* type (after the type location) tectonically raised from a depth of some 3.5 km as a result of the weight of the Pitcairn volcano formed over the hotspots in the mantle under the archipelago some 13 million years ago. The limestones are of late Tertiary age and were exposed about 380,000 years ago (Spencer & Pawlay, 1989; Blake, 1995). The land is surrounded by vertical 15-30m high limestone cliffs undercut on all sides except the north. These have protected the island and its wildlife from the overwhelming most atolls undergo during cyclonic storms. It is surrounded by a fringing reef averaging 50-100m wide and extending to 200m offshore on the north, north-west and north-east sides of the island, backed by narrow sand beaches (St John & Philipson, 1962). Those off the north and north-east beaches are seaward sloping reef platforms without reef crests, not typical fringing reefs. The east shore has a poorly developed lagoon. There are two narrow channels through the reef on the north and north-western sides. Tides are semidiurnal and the tidal range of spring tides is about one metre (Serpell *et al.*, 1983).

CLIMATE

Henderson Island has a moderate subtropical climate and lies in the path of the southeast tradewinds. During the 1991-2 expedition the total rainfall measured from February 1991 to January 1992 was 1,623mm; the mean annual rainfall is probably between 1,300mm and 1,500mm. The average monthly maximum temperature during the same period ranged from 29.6°C in February to 24.2°C in June. The average monthly minimum temperature ranged from 22.2°C in February to 15.7°C in June and may range between 23-30°C in summer, 24-26°C in winter (Brooke, 2004).

VEGETATION

The terrestrial vegetation of the island is rich and almost undisturbed. Due to its relative freedom from man and cyclonic inundations the flora and fauna are unique relicts of the original undegraded condition. According to the Management Plan by Brooke *et al.*, in 2004 there were 71 species of vascular plants, seven of which are endemic to the island and ten introduced, with some 20 bryophytes and 30 lichens. The island has high endemism for its size: only 15% of the flora is introduced. There are six vegetation communities: beachfront, beach-back woodlands, open scrub on cliff slopes, cliff and ledge communities, exposed cliff top, and plateau forests. On the strandline these are widespread Pacific or Indo-Pacific plants. The beach swale woodlands contain the endemics *Santalum hendersonense*, *Myrsine hosokae*, *Celtis paniculata* var. *viridis* and two endemic varieties of *Bidens hendersonensis* with *Pandanus tectorius*, and introduced hardwoods, Pacific rosewood or *Miro* *Thespesia populnea*, *tou Cordia subcordata* which have long been harvested by Pitcairn islanders who also planted fruit trees such as coconut *Cocos nucifera*. The presence of tall woody members of a mainly herbaceous family, the Compositae: *Bidens hendersonensis* and *Senecio stokesii*, is of particular botanical interest as showing some affinities with a relict southern flora. Most of the plants, such as beach gardenia *Guettarda speciosa* and the tall screw-pine *Pandanus tectorius* which covers about 15% of the island, come from eastern Polynesia by introduction, by island hopping or floating.

The most diverse forests are on the top of the raised coral plateau. Most of the surface is a dense mass of tangled vines, scrub forest and semi-recumbent trees 4m - 7m tall, though the centre of the depression is more sparsely covered and the southern tip is exposed to salt spray and wind. There are a few artificial clearings. The typical closed forest is dominated by widespread *Pisonia grandis*, with *Xylosma suaveolens* on poorer soils, and several other species such as *Celtis pacifica*, *Nesoluma st-johnianum*, endemic to Henderson, and a wide variety of other species. The shrub layer is sometimes sparse, but is dominated by *Psydrax odoratum* and the endemics *Ixora fragrans* and *Geniostoma hendersonense*. The ground layer is dominated by ferns and the endemic *Peperomia hendersonensis*.

Senna glanduligera, the *Bidens hendersonensis* and *Senecio stokesii* favour gaps in the canopy. The flora is described by St John & Philipson, 1962; Fosberg *et al.*, 1983; Flenley *et al.*, 1987 and Waldren *et al.*, 1997, summarised in Brooke *et al.*, 2004.

FAUNA

Fauna recorded from the island were listed by Brooke *et al.* in 2004. All four of the island's land birds are endemic: the flightless Henderson crake *Porzana atra* (VU: 6,200 in 1992), Henderson lorikeet *Vini stepheni* (VU: 1,200 pairs in 1992), Henderson fruit dove *Ptilinopus insularis* (VU: 3,400 in 1992) and Pitcairn reed warbler *Acrocephalus vaughani taiti* (EN: 9,500 in 1992). Little information is yet available on the ecology or status of these four birds. The island is very important for its large breeding population of seabirds, estimated at 50,000-80,000 pairs, at least nine species of which breed on the island: Henderson petrel *Pterodroma atrata* (EN: the world's largest breeding population), phoenix petrel *P. alba* (EN), Murphy's petrel *P. ultima* (thousands), herald petrel *P. heraldica* (30,000 pairs), Kermadec petrel *P. neglecta* (10-20,000 pairs), wedge-tailed shearwater *Puffinus pacificus*, masked booby *Sula dactylatra* (50-60 pairs), red-footed boobies *S. sula* (a few hundred pairs), great frigatebirds *Fregata minor* 100 pairs), red-tailed tropicbird *Phaethon rubricauda* (2-300 pairs), brown noddy *Anous stolidus* (100 pairs), black noddy *A. minutus* (a few), blue noddy *Procelsterna cerulea* (10 pairs), and fairy tern *Gygis alba* (thousands). There is also a wintering population of some 40-50 bristle-thighed curlews *Numenius tahitiensis* (VU). Small numbers of wandering tattlers *Heteroscelus incanus*, sanderlings *Calidris alba*, Pacific golden plovers *Pluvialis fulva* and Pacific reef herons *Egretta sacra* occur on the beaches (Heppburn *et al.*, 1992).

There is no native species of land mammal. The only rat, the introduced Polynesian rat *Rattus exulans*, is the main threat to petrel chicks. The humpback whale *Megaptera novaeangliae* occurs. Green turtles *Chelonia mydas* (EN) occasionally nest on the east beach where up to 30 scrapes were reported in 1991/92. There is one gecko *Lepidodactylus lugubris*, one abundant species of skink *Emoia cyanura* and two other species. All the island's 16 species of land snail and about 30% of the 180 insect species may be endemic. One species of butterfly, *Hypolimnas bolina*, has been seen (Holloway, 1990). The proportion of endemic species in some other invertebrate groups is given by Heppburn *et al.* (1992).

Coconut crabs *Birgus latro*, green spiny lobster *Panulirus penicillatus* and land crabs *Gecarcinidae* spp. are present. Collections of marine molluscs and sponges and of unidentified caridean shrimps, mostly Alpheids, of 5-8 species, were made in 1987. A list of 305 marine molluscs recorded from Henderson is given in Fosberg *et al.* (1983). There is a diverse echinoderm fauna. An unidentified holothurian is common on the northern reef flats, and an echinoid *Heterocentrotus* sp. (possibly *H. trigonarius*) is locally abundant on the sloping marginal reefs and shallow reef flat of the northern beach. Records of the marine and littoral fauna were made by Paulay (1987), Broodbakker (*in litt.*, 1981 & 1987) and Richmond (*in litt.*, 1987). 190 species of fish are recorded with black jack *Caranx lugubris* being the most common Brooke *et al.*, 2004). The coral is growing at the limit of reef growth. The cover is about 5%, dominated by *Pocillopora*, with *Millepora*, becoming dominant at depths greater than 7m (Paulay, 1987). Submassive *Acropora* colonies are also present on the buttresses and solid substratum (Richmond *in litt.*, 1987). In total, 19 genera and 29 species of coral were collected in 1987 (Paulay, 1987). A more comprehensive account of the corals is given in UNEP/IUCN (1988).

CONSERVATION VALUE

This is one of the world's few forested raised atolls where, because of its remoteness and inhospitable terrain, and freedom from inundation, the ecology is essentially intact. Its fossil corals record the changes in sea levels and the climate; its isolation makes it ideal study site on the dynamics of island evolution and natural selection. Ten plants, four land birds and many smaller organisms are endemic to the island on which, unlike other Pacific islands, few exotic species exist. It also provides a refuge for species under pressure elsewhere. It lies within a WWF Global 200 Marine Ecoregion.

CULTURAL HERITAGE

The island is uninhabited apart from occasional visitors because of its lack of resources. But there is evidence of gardens and charcoal burning in the past and recent archaeological discoveries show that Henderson was colonised by a small Polynesian group between the late 8th and 17th centuries (Weisler, 1995). Their impact may have been slight except on now extinct bird species, although there is some disagreement over this (Fosberg *et al.*, 1983; Steadman & Olson, 1985; Bourne & David, 1986).

LOCAL HUMAN POPULATION

The island is uninhabited but is usually visited by Pitcairn islanders once or twice a year, chiefly to cut *miro* and *tau* for carvings made for sale to visitors to Pitcairn, also for the local sandalwood. However, it has not been necessary to make the journey for these woods since 2004 (UNESCO, 2010)

VISITORS AND VISITOR FACILITIES

Access to Henderson requires a licence issued by the Governor following approval by the Pitcairn Island Council. Information and a visitors' code of conduct can be passed to visitors at previous ports via the Pitcairn Islands website. Cruise ship groups and scientists visit occasionally and during the 15 month 1991-2 expedition, 140 visitors called, but there are no sheltered moorings and landing is often difficult. There is also almost no water and no facilities and visitors are largely restricted to the beach. (Brooke *et al.*, 2004).

SCIENTIFIC RESEARCH AND FACILITIES

Henderson Island is the world's best remaining example of an elevated coral atoll ecosystem and is of outstanding value because of the comparatively low level of disturbance which provides a key for baseline information on similar atolls. Its isolation makes it ideal for studying the dynamics of island evolution and natural selection. Its fossil corals are valuable indicators of changes in sea level and climate over 630,000 years. The island was first discovered to the west in 1825, but scientific studies only began in the in the 20th century. Several short scientific expeditions have been made to the island, starting in 1912 during phosphate prospecting. Studies have been made of its geology, ecology, marine ecology and archaeology, which revealed evidence of long past Polynesian occupation. This importance was emphasised by the International Biological Programme and by a resolution of the 15th Pacific Science Congress in 1983. The most important were the Whitney South Seas Expedition in 1922, the Mangarevan Expedition of 1934, Operation Raleigh in 1986, a Smithsonian Institution expedition in 1987 and by the intensive 15-month long Sir Peter Scott Commemorative Expedition in 1991-1992. The information from the last became the main basis for the management plan and was published by Brooke & Spenser in 1995 and summarised in Brooke *et al.* in 2004. There are no facilities, but research is encouraged by the government and the island is well documented.

MANAGEMENT

The island is strictly preserved, chiefly by its inaccessibility and lack of tourist attractions. It is managed by the Pitcairn Island Council under their Governor, the British High Commissioner to New Zealand. Access to Henderson requires a licence issued by the Governor following approval by the Pitcairn Island Council. In 2004 a five-year Management Plan was agreed between the U.K. government, the Joint Nature Conservation Committee and the Pitcairn Island Council, and its implementation started in 2005. The management objectives it outlined were: protection of the environment and its wildlife; preservation of *miro* and *tau* stocks for the future; prevention of damage to the environment, especially by the control of visitors to ensure low impact tourism; prevention of the introduction of exotic species; protection of archaeological relics; and promotion of knowledge of the island, monitoring and research (Brooke *et al.*, 2004). Ramsar and Biosphere Reserve status have been proposed. The annual or bi-annual visits by Pitcairn islanders to cut *miro* could also monitor the trees' health.

MANAGEMENT CONSTRAINTS

Goats and pigs were introduced to the island early in the century, but have not survived and may not be reintroduced. Rats are still a threat to bird life, especially to the endangered ground-nesting Henderson petrel, although this rat is the small Polynesian species *Rattus exulans*, not the black or brown species. A program to eradicate them with poisoned bait trialled in 2009 was carried out in 2011. Temporary impoundment of the crane chicks should avoid killing them too (UNESCO, 2010). The terrestrial vegetation has very few exotics, although there are two substantial coconut groves at the principal landing sites and other fruit trees and *Cordyline terminalis* were deliberately introduced, *Lantana camara* and *Achyranthes aspera*, accidentally. In 1982-3 the island came under threat from a proposal by a millionaire to build a house, landing facilities, airstrip and cattle ranch which would have severely damaged the terrestrial fauna and flora and impact the reefs. The proposal was opposed by scientific and conservation bodies who petitioned the British Government to deny permission to the plans which was eventually done (Fosberg & Sachet, 1983; Serpell *et al.*, 1983). In 1986 a trail was irresponsibly cut across the island by a party of amateur explorers (Operation Raleigh) which spread several species of plants into new habitats.

STAFF

Staff resources are inadequate and the Site Manager combines his position with other work. However, the Pitcairn Island Conservation Officer and scientists from Britain can advise and the Islanders' annual visits could report on illegal fishing and exotic species (FCO, 2006). A ranger post has been built and a full-time ranger post is being considered (UNESCO, 2010).

BUDGET

The FCO/DFID funded the management plan. The RSPB has funded two small projects (FCO, 2006).

LOCAL ADDRESSES

Pitcairn Island Administration, P.O.Box 105696, Auckland, New Zealand.

Overseas Territories Department, Foreign & Commonwealth Office, London, SW1A 2AH. United Kingdom.

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DATE

April 1988. Updated 5-1990, 8-1995, 1-2008, 10-2010, June 2011.