

## World Heritage Sites

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### UJUNG KULON NATIONAL PARK & KRAKATAU NATURE RESERVE JAVA, INDONESIA

*This National Park is on the Sunda Straits at the extreme southwestern tip of Java. It covers the Ujung Kulon peninsula, several offshore islands and the volcanic nature reserve of the island of Krakatau. It is one of the last remaining extensive stands of lowland rainforest in Java, and the last main habitat of the seriously threatened Javan rhinoceros. It is also a beautiful area, containing several other endangered species of plants and animals and is of geological interest, particularly for the study of volcanoes.*

**COUNTRY** Indonesia - Java

**NAME** Ujung Kulon National Park and Krakatau Nature Reserve

#### NATURAL WORLD HERITAGE SERIAL SITE

1991: Inscribed on the World Heritage List under Natural Criteria vii and x

#### IUCN MANAGEMENT CATEGORY

Ujung Kulon National Park: II (National Park)

Krakatau Nature Reserve: Ia (Strict Nature Reserve)

#### BIOGEOGRAPHICAL PROVINCE

Java (4.22.13)

#### GEOGRAPHICAL LOCATION

The Ujung Kulon National Park is a peninsula in the Sunda Straits between Java and Sumatra at the extreme southwestern tip of Java. The western boundary encloses the Ujung Kulon Peninsula, the offshore islands of Pulau Handeuleum and Pulau Peucang with the island of Pulau Panaitan 10 km northwest across the Panaitan Strait, and the Krakatau Nature Reserve some 60 km north across the Sunda Straits. The eastern boundary runs along the eastern foothills of the Gunung Honje massif. Ujung Kulon lies at approximately 6° 45'S by 105° 20'E and Krakatau at approximately 6° 06'S by 105° 25'E.

#### DATES AND HISTORY OF ESTABLISHMENT

1921: Krakatau declared a Nature Reserve;

1937: Pulau Panaitan/Pulau Peucang Nature Reserve established under Decree GB/17/Stbl/420;

1958: Ujung Kulon Nature Reserve established under Decree 48/kpts/Um/4/58;

1967: Gunung Honje Nature Reserve established;

1980: Ujung Kulon Peninsula, Panaitan Island, South Gunung Honje, North Gunung Honje and the Krakatau Islands Nature Reserves proposed as a National Park.

1992: Ujung Kulon National Park established by Ministry of Forestry Decree

284/Kpts-II/1992, comprising the five Nature Reserves and an extended Marine Reserve;

2005: Designated an ASEAN Heritage Park.

#### LAND TENURE

Government; within the provinces of Banten in Java and (Krakatau) Lampung in Sumatra. Administered by the Taman Nasional (National Park) Ujung Kulon Authority (TMUK) under the Directorate of Nature

Conservation of the Ministry of Forestry. The Krakatau Nature Reserve is managed separately by Nature Resource Conservation, Lampung, Sumatra.

#### **AREA**

Total area 123,051 ha: Ujung Kulon National Park 120,551 ha: (terrestrial zone: 76,214 ha, marine zone, 44,337 ha). Krakatau Islands Nature Reserve 2,500 ha.

#### **ALTITUDE**

Sea-level to 620m (Gunung Honje) and 813m (Rakata, Krakatau islands).

#### **PHYSICAL FEATURES**

Ujung Kulon ('West Point') is a triangular peninsula at the southwest end of mainland Java, to which it is joined by a low isthmus some 1-2 km wide. In the southwest it is dominated by the three north-south aligned ridges of the Gunung (Mount) Payung massif. Their peaks of Gunung Payung (500m), Gunung Guhabandang and Gunung Cikuja are the highest points on the peninsula. In the northeast, the relief drops to the low rolling hills and plains of the Telanca plateau, and the low-lying swamps of the isthmus. On the mainland to the east is the Gunung Honje massif. The coastline is diverse: formations include a number of raised coral islands and their fringing reefs which lie off the northern coast of the peninsula, the largest being Pulau Handeuleum. To the south, there are sand dunes, areas of raised coral reef, and further west, a long stretch of undermined and shattered sandstone slabs. Extensive coral reefs and spectacular volcanic formations occur along the exposed and broken west coast.

Geologically, Ujung Kulon, Gunung Honje and Pulau Panaitan are part of a young Tertiary mountain system, which overlies the pre-Tertiary strata of the Sunda Shelf. Both Ujung Kulon and Gunung Honje may have formed the southernmost extension of the Sumatran Bukit Barisan mountains during the Pleistocene, having become separated from Sumatra on the collapse of the Sunda straits dome. Central and eastern Ujung Kulon comprise raised Miocene limestone formations overlain in the north by alluvial deposits and in the south by sandstones. To the west, the Gunung Payung massif is of Miocene sedimentary origin, and Pulau Panaitan Island is similar although volcanic material and breccias form outcrops in the north-west. The Gunung Honje massif to the east is an eastward-tilted mountain block, its western edge being broken by a fault line running parallel to the coast (Hommel, 1987).

Drainage is from three distinct water catchments. The Telanca plateau drains southward via the Citadahan, Cibandawoh and Cikeusik rivers, and northeast and eastward via the Cikarang and Cigenter rivers. The southwestern massif drains radially via numerous perennial streams. Gunung Honje drains westward to Welcome Bay and southwards to the Indian Ocean. The soils of the whole area underwent extensive local modification by volcanic ash during the 1883 Krakatau eruption (Hommel, 1987). The soils of the central plateau are grumusols, regosols and mediterrans; those of the Gunung Payung and Honje massifs are yellowish-red and brown latosols. To the northwest and east along the peninsula and the narrow isthmus coast, alluvial hydromorphs predominate (Blower & van der Zon, 1977).

Krakatau lies on the edge of the tectonically active Sunda Shelf. The Reserve comprises the central island of Anak Krakatau (child of Krakatau), and the peripheral islands of Rakata, Payang and Sertung with their surrounding coral reefs. These islands form the remnants of a single andesitic volcano which exploded and collapsed some 1,500 years ago leaving three remnant cones. These eventually coalesced into an island, Krakatau, which erupted on 26-27 August 1883 expelling some 18 to 21 cu. km of material and killing more than 36,000 people in the immediate area. Volcanic activity recommenced 40 years after the main explosion, resulting in 1930 in the emergence of Anak Krakatau which is now 181m high and 2km across. The highest point is on Rakata Island, at 813m. The area continues to experience volcanic activity, with significant eruptions taking place in 1952, 1972, 1992 and 1994 (M. Clarbrough, pers. comm. 1994).

#### **CLIMATE**

Conditions are tropical maritime, with a mean annual rainfall of approximately 3,250mm. The heaviest rainfall is between October and April during the north-west monsoon. A noticeably drier period occurs between May and September during the south-east monsoon. Mean monthly rainfall figures of 400mm have been recorded for December and January, and 100mm per month during May to September. Mean temperatures range between 25°C and 30°C and the relative humidity ranges between 65% and 100% (Blower & van der Zon, 1977; Hommel, 1987). The Park suffered no damage from the 2004 tsunami.

## VEGETATION

The Park's vegetation is semi-evergreen rainforest, which has suffered a number of anthropogenic and natural modifications. It is mainly secondary growth, following the destructive eruption tsunami of 1883. It is dominated by *Arenga* palms wild sugar cane *Arenga pinnata*, *A. obtusifolia* and rattan *Calamus melanoloma* among other rattan species, the last having grown as a pioneer over a mosaic of former fields and settled areas. The *Arenga* palms which grow on thick ash, may be dominant as a result of long-past volcanic disturbance. As a result, the natural vegetation cover, primary lowland rain forest, now occupies only 50% of the total area, and is largely confined to the Gunung Payung and Gunung Honje massifs. Other vegetation types are beach forest, mangrove and swamp. At least 50 species of rare plants are present (K.MacKinnon, pers. comm., 1991).

A tall closed-canopy primary forest grows on Gunung Payung, characterised by *Dillenia excelsa*, *Pentace polyantha* and *Syzygium* sp., with an understorey of low palms and herbs. Primary forest also occurs on Pulau Peucang with an open canopy and numerous emergents up to 40m high. Dominant tree species are *Parinari corymbosum*, *Lagerstroemia speciosa*, *Rinorea lanceolata*, *Pterospermum diversifolium*, *Intsia bijuga*, *Eugenia* spp., *Aglaiia* spp., and *Diospyros* spp. Primary lowland forest of the Gunung Honje region includes *Pterospermum javanicum*, *Dipterocarpus gracilis*, *Intsia bijuga*, *Lagerstroemia speciosa*, *Ficus* spp. and *Eugenia* spp. Understorey includes palms such as *Arenga obtusifolia* and *Calamus* sp. (*rotan*) The higher slopes are characterised by trees such as *Castanopsis* sp. which occur in a denser canopy dominated by *Podocarpus nerifolius*, *Turpinia sphaerocarpa*, *Fagraea racemosa*, *Dipterocarpus hasseltii*, *Aphanamixis* spp. and *Eurya* spp. The understorey is characterised by extensive moss growth both on the ground and on trees, as well as by the occurrence of epiphytic orchids such as *Asplenium nidus* and ferns such as *Freycinetia* spp.

The vegetation of the Telanca plateau and central lowlands is a more open secondary forest, dominated by palms, such as *Arenga pinnata*, *A. obtusifolia* and *Caryota mitis*, which may occur in almost pure stands interspersed with taller canopy trees, such as *Lagerstroemia flosreginae*, *Diospyros macrophylla*, *Vitex pubescens*, *Ficus* sp., and *Planchonia valida*. Alternating with palm forest are dense stands of bamboo and *Zingiberaceae*, such as *Achasma* spp., *Nicolaia* spp. and *Lantana camara*. Occurring along the northern promontory of Ujung Kulon near Tanjung Alangalang is a seasonally inundated freshwater swamp forest. Dominant species include *Typha angustifolia* and *Cyperus* sp., of which the commonest is *Cyperus pilosus*. Some 64 hectares of artificially created grasslands are maintained as grazing for ungulates (Blower & van der Zon, 1977; Hommel, 1987).

Mangrove forest occurs in a broad belt along the northern side of the isthmus, extending northwards as far as the Cikalong River, as well as north of Pulau Handeuleum and on the north-east coast of Pulau Panaitan. Tree species include *Sonneratia alba*, *Lumnitzera racemosa*, *Nypa fruticans*, *Avicennia* spp., *Rhizophora* spp., and *Bruguiera* spp. Beach forest occurs on nutrient-poor sandy ridges on the north and north-west coasts of Ujung Kulon, and is typified by such species as *Calophyllum inophyllum*, *Barringtonia asiatica*, *Hernandia peltata*, *Guettarda speciosa*, *Terminalia catappa* and *Pongamia pinnata*. Other coastal vegetation includes pioneering formations along the upper edge of beaches, above the high tide mark. Characteristic species include *Ipomoea pes-caprae*, *Spinifex littoreus* and *Canavalia maritima*.

The vegetation of the Krakatau group is characterised by a number of different stages of succession. Rakata, the largest peripheral island, contains extensive *Neonauclea calycina*-dominated moss forest which extends from the summit area (813m) down to about 650m. Sertung, to the northwest, is maintained in a state of early biotic succession by active geological processes of erosion and accretion. The central volcanically active island of Anak Krakatau is characterised by vegetation in the early stages of succession following effective sterilisation by the eruption of 1952 (Thornton *et al.*, 1984). The eruptions between 1992 and 1994 again severely retarded the colonisation of Anak Krakatau, with the coastal stand of ironwood *Casuarina equisetifolia* being cut by a lava flow (M. Clarbrough, pers. comm., 1994). The development of the vegetation and floras of the Krakatau Islands is described by Whittaker *et al.* (1989).

## FAUNA

Ujung Kulon has probably the most complete surviving fauna on Java (Whitten *et al.*, 1996) and is the last remaining viable natural refuge for Javan rhinoceros *Rhinoceros sondaicus sondaicus* (CR), for which the most recent estimate indicates a small fairly stable total population of between 53 individuals (TMUK in litt., 2003) to 60 in 2004, according to the International Rhinoceros Foundation. Javan tiger *Panthera tigris* (EN) was locally extirpated about 40 years ago (M. Clarbrough, pers. comm. 1994).

Primates include the endemic Java gibbon *Hylobates moloch* (CR), ebony leaf monkey *Trachypithecus auratus* (EN), Javan leaf monkey *Presbytis comata* (EN), endemic silvered leaf monkey *P. cristata*, crab-eating macaque *Macaca fascicularis* and slow loris *Nycticebus coucang*. Carnivores include wild dog or dhole *Cuon alpinus* (VU), common otter *Lutra lutra*, oriental small-clawed otter *Ambonyx cinereus*, leopard *Panthera pardus*, leopard cat *Felis bengalensis*, fishing cat *F. viverrina*, Javan mongoose *Herpestes javanicus* and various civets, including binturong *Arctictis binturong*. Several ungulates range within the Park, of which the largest and most abundant is banteng *Bos javanicus* (EN), with a population of around 700 on Ujung Kulon Peninsula and Gunung Honje. Others include wild boar *Sus scrofa*, barking deer *Muntiacus muntjak*, lesser mouse deer *Tragulus javanicus* and rusa deer *Cervus timorensis*.

A rich avifauna of over 270 species is recorded, including frigate bird *Fregatta ariel*, dusky grey heron *Ardea sumatrana*, lesser adjutant *Leptoptilos javanicus* (VU), milky stork *Mycteria cinerea* (VU), osprey *Pandion haliaetus*, brahminy kite *Haliastur indus*, white-bellied sea eagle *Haliaeetus leucogaster*, grey-headed fish-eagle *Ichthyophaga ichthyaetus*, green peafowl *Pavo muticus* (VU), large green-pigeon *Treron capellei* (VU) and Sunda coucal *Centropus nigrorufus* (VU). These species also occur: reef heron *Egretta sacra*, two Ciconiidae (storks), jungle fowl *Gallus gallus* and *G. varius*, Nicobar pigeon *Caloenas nicobarica*, nine other species of Columbidae (doves), 16 species of Cuculidae (cuckoos), ruddy kingfisher *Halcyon coromanda* and black-banded barbet *Megalaima javensis*.

Terrestrial reptiles and amphibians include two species of python, reticulated python *Python reticulatus* and Indian rock python *Python molurus* as well as two crocodiles, false gharial *Tomistoma schlegelii* and estuarine crocodile *Crocodylus porosus*, water monitor *Varanus salvator* and numerous frogs and toads (Blower & van der Zon, 1977). Green turtles *Chelonia mydas* (EN) are known to nest within the park (K. MacKinnon, pers. comm., 1991). Hawksbill turtles *Eretmochelys imbricata* (CR) and dugong *Dugong dugon* (VU) are also seen. The terrestrial vertebrate fauna of the Krakatau Islands is described by Rawlinson *et al.* (1990).

On the Krakatau islands some 40 species of resident birds have been recorded by Thornton *et al.* (1984), seven more than recorded in 1952 by Hoogerwerf (1953). Species include black-naped fruit pigeon *Ptilinopus melanospila*, large brown cuckoo dove *Macropygia phasianella*, emerald dove *Chalcophaps indica*, collared kingfisher *Halcyon chloris* and yellow-vented bulbul *Pycnonotus goiavier*. Two species normally associated with mangroves, mangrove flycatcher *Cyornis rufigastra* and mangrove whistler *Pachycephala cinerea*, are notable as persisting on the islands despite the loss of favoured habitat. The birds of the Krakatau group and their colonisation of these islands are described by Zann *et al.* (1990) and Thornton *et al.* (1988). Avifaunal inventories are given by Hoogerwerf (1953, 1969), Blower & van der Zon (1977) and a preliminary faunal inventory for the Krakatau islands by Thornton *et al.* (1984).

The coral bleaching event of 1998 severely affected this area and studies are needed to gauge the extent of the degradation. Before this, a detailed account of the Ujung Kulon and Krakatau reefs was given in UNEP/IUCN (1988). The rich coral reefs of the Ujung Kulon coast were dominated by a small number of species that made up some 90% of the coral mass. Of these, tabletop coral *Acropora* spp. may have dominated at 3-15m below sea level, while *Acropora* spp. and *Pocillopora* spp. may have been co-dominant in shallower water. Other shallow water species included *Millepora platyphylla* and *Porites lutea*. Below 15m, sea fans *Gorgonacea* were abundant, along with *Favia* sp., *Favites* sp., *Dipluria* sp., *Turbinaria* sp. and *Echinopora* sp. The reefs of the Krakatau Islands, particularly the narrow patch reefs to the west of Sertung and north of Rakata, were being colonised by pioneer species, such as *Porites* spp., and secondary colonisers such as *Acropora* sp. and *Pocillopora* sp.

According to Halim and Kvalvagnaes (1980), the marine areas of Ujung Kulon supported some of the richest fish fauna in the archipelago, with both deep water and reef species well represented. Deep water species include barracuda, sailfish, tuna, skipjack and sharks; reef fish include 15 species of butterfly fish, such as *Chaetodon* spp., four species of triggerfish, including *Odonis niger* and *Balistoides niger*, as well as angel fish *Pomocanthus* sp., batfish *Platax junnatus* and *P. orbicularis*, and moorish idol *Zanclus cornutus*. Notable fish of the intertidal and brackish zones include archer fish *Toxotes jaculatrix* and mudskippers. The invertebrate fauna is rich and includes cowries *Stromus* sp., as well as *Lamias* sp. and *Nautilus* sp. Preliminary inventories of reef fish, molluscs and corals are given in Halim & Kvalvagnaes (1980). Salm *et al.* (1982) give faunal inventories for marine areas of Krakatau. Again, the effect of recent coral bleaching on reef species has not yet been measured.

## **CULTURAL HERITAGE**

Pulau Panaitan has a Ganesha statue on the summit of Mt. Raksa, an early Hindu archaeological relic from the first century AD (M. Clarbrough, pers.comm.1996), and the island is thought to have been an important staging post for sailing ships passing through the Sunda Straits (Blower & van der Zon, 1977). Captain James Cook is known to have anchored HMS Endeavour on the southeastern side of Panaitan Island, then known as Princes Island, from 6th-16th January 1771. At this time 300 houses were recorded in the village of Samadang. Since the early 1800's, a lighthouse has been maintained at Tanjung Layar, on the extreme western point of the peninsular. The current lighthouse is the third structure to be built (M. Clarbrough, pers. comm.,1996).

## **LOCAL HUMAN POPULATION**

There are 19 villages to the north, west and east of the Gunung Honje range in the buffer zone which was set up to stabilise the eastern boundaries of the protected area. These contain some 44, 518 people (Ujung Kulon National Park Management Plan, 1995). The native Sundanese traditionally used the area for hunting, fishing and gathering, now all illegal within the Park. A number of villages still encroach on the Park, but the one permanent settlement within it, of 77 families at Legon Pakis, and some 89 families at Kecamatan Sumur were to be moved out (J. Thorsell, pers. comm.,1991). Assistance to the surrounding communities has included the introduction of cash crops such as bamboo and rattan. The Krakatau islands are uninhabited (M. Clarbrough, pers.comm.,1996). The understanding and appreciation of the Park's World Heritage status by the local communities has been low and have been promoted by Rare (Rare Animal Relief Effort) through publications and school extension activities.

## **VISITORS AND VISITOR FACILITIES**

The Park received nearly 6,000 visitors in 1997 plus an unknown number visiting Krakatau, mostly between April and August. More recently visitors numbered 4,000 visitors per year, half being foreigners, and the memory of the 2002 terrorism has affected tourism. A Forestry Service permit is necessary. A 50-person guest house with cottages is available on Peucang Island, which is mostly visited by foreign tourists, though there is also less expensive Park-run accommodation. On Handeuleum Island there is an 8-bed lodge. There is village accommodation and a Park information centre at Tamanjaya. There are camping areas at Citalang and Nyawaan on the northern coast. Popular activities in the Park include trekking, diving and game fishing; surfing is also possible. There are good trails with a number of guard-posts and shelters and observation towers on Peucang. Access to Ujung Kulon is by boat from Labuhan on the west coast of Java and by road from Labuhan via Sumur to Cikawung at the base of the south-western slopes of Gunung Honje Range; also via Cibadak to Cegog on the south coast

## **SCIENTIFIC RESEARCH AND FACILITIES**

Research has been conducted on the Javan rhinoceros (Schenkel & Schenkel-Hulliger, 1969; Schenkel *et al.*, 1978; Ammann, 1985, Santiapillai *et al.*, 1990, and Sriyanto, A. *et al.*, 1996), banteng (Alikodra, 1987), the avifauna (Hoogerwerf, 1953, 1969), marine resources (Halim & Kvalvagnaes, 1980; Salm *et al.*, 1982) and landscape ecology (Hommel, 1987). During 2001 research was conducted by the Park management on the rhino population, on rhino and wild cattle by Sectionov *et al.*, Ida Ayu Alit *et al.* and Yaksi Hadi *et al.*; on orchids by Mujahidin *et al.*, on anthropology by Vangsnæs, mangroves by Hamzah, zones by Iskandar, deer and monitor lizard by Syarif & Mukhtar, and on single rattan by Mulyana *et al.* The Krakatau Islands have been well studied, particularly its colonisation by plants (Whittaker *et al.*, 1989) and various faunal groups (Compton *et al.*, 1988; New *et al.*, 1988; Smith & Djajasasmita, 1988; Thornton & New, 1988; Thornton *et al.*, 1988, 1990; Tidemann *et al.*, 1990; Zann *et al.*, 1990). Much of the research is published in the Philosophical Transactions of the Royal Society of London B (1988, 1990). The permanent recording devices of volcanic activity on Anak Krakatau were destroyed by the 1992 eruptions, and there has been no on-site monitoring while the eruptions continue (M. Clarbrough, pers. comm.,1996).

## **CONSERVATION VALUE**

Ujung Kulon National Park protects the largest and one of the last remaining areas of lowland rainforest in Java. It is of vital importance for the conservation of the seriously threatened Javan rhinoceros and contains many other species of endangered plants and animals. The coastal coral reef was ranked among the richest in Indonesia before bleaching. The Krakatau islands are of great scientific interest because they provide one of the world's best examples of recent island vulcanism and tropical vegetation succession (Thornton *et al.*, 1984). The Park lies within a Conservation International-

designated Conservation Hotspot, a WWF Global 200 Eco-region, a WWF/IUCN Centre of Plant Diversity, is in one of the world's Endemic Bird Areas and is an ASEAN Heritage Park.

## CONSERVATION MANAGEMENT

The principal reason for the designation of Ujung Kulon National Park as a Natural World Heritage site is as the last significant habitat of the threatened Javan rhinoceros *Rhinoceros sondaicus sondaicus* (CR) on which the Park's management focuses as a flagship species. Every threat to its survival receives first priority. Alongside this, the declared goal of the 2001-2020 Management Plan (TMUK in litt.,2003) is to establish Ujung Kulon as a sustainable and beneficial National Park through the realisation of the following five management objectives:

- o Improvement of the welfare of the local community by encouraging home and craft industries;
- o Development of ecotourism in Ujung Kulon National Park and in Banten province, Indonesia;
- o Protection of flora, fauna, ecosystems and cultural sites within the National Park as the largest and one of the last large remaining areas of lowland rainforest in Java;
- o Establishment of the role of the National Park in scientific, technical and educational developments;
- o Development of the sustainable utilisation of biodiversity at the levels of gene, species and ecosystem.

To achieve these five objectives, the Park has five inter-related management programs: Integrated Java Rhino Management, Primates Management, Marine Management, Buffer Zone and Ecotourism Management, described below. They are supported by the UNESCO/UN Foundation / UN Environmental Programme/ RARE projects focussing on public use planning to help the Park management authority to plan for itself. The local communities have been aided by RARE which specialises in improving conservation-community relations world-wide.

### 1: Integrated Java Rhino Management:

Rhino management is based on the ecosystems which are its habitat. Its home range is 38,543 hectares of the peninsula which also supports primates, other mammals and birds. The management of these, of the marine area, the buffer zone and ecotourism therefore all support the management of the Java rhino. In spite of many conservation efforts, the rhino population has shown no growth since the early 1980s. It rose from 25 in 1967 to about 65 in 1981 and 1982, declining with fluctuations between 65 and 45 to 53 in 2000. It is not known if this is due to its having reached the carrying capacity of its habitat area or to other factors, internal and external. Three assumptions about its cause are: human disturbance, competition for food and low numbers of young. Tourism is permitted as long as it does not disturb the rhino. Poaching, which is illegal, has not occurred for five years, and all such illegal activities are kept under control. Competition for the same fodder plants from the much larger population of wild cattle may also be a reason. The low birth rate is attributed to low heterozygosity due to incest. Controversial proposals were put forward in the 1980s by the IUCN Asian Rhino Specialist group to remove some 25 Javan rhinoceros for a captive breeding programme to mitigate the alleged effects of inbreeding depression and to reduce the population's susceptibility to environmental disturbance; see Khan (1990) and MacKinnon *et al.*,(1990).

To determine the causes of this decline and the sex and ages of the population, and to support management objectives, the Park cooperates with WWF and the International Rhino Foundation (IRF) in the Rhino Monitoring and Protection Unit program (RMPU). This has five staff members: two Park rangers, two local people and one local NGO representative. It comprises three units which patrol and monitor rhino habitat for 21 days each month, two units being in the field, with one resting. They collect data on and map the distribution of rhino and other animals, vegetation and illegal human activity. This lessens poaching and other illegal intrusions and provides a valuable data base. The size of the rhino population is monitored by annual inventory by counting tracks, by automatic photo trapping and by DNA analysis.

### 2: Primate Management :

The Java gibbon and Java leaf monkey are endemic to the primary forests of western Java. They live only in this habitat which locally comprises 19,214 ha on Gunung Honje, 17,500 ha on Panaitan island, 471 ha on Peucang island and 220 ha on Handeleum island. Preserving, patrolling and monitoring the habitat of these animals therefore preserves the other animals and resources of the primary forest.

### 3: Marine Management:

The resources of the 44,337 ha marine area of Ujung Kulon are under protection but not yet inventoried. Even with protection, there has been much destruction, necessitating intensive research-based management. This is done by the Coastal Patrol and Monitoring Unit which has five units which patrol and monitor the reserve, prevent or limit poaching and collect data on and map the distribution of marine life and coral, marine vegetation and illegal human activity. This, like the RMPU, prevents illegal violent fishing activities and contributes to the Park's data base.

### 4: Buffer Zone Management:

There are nineteen villages in the buffer zone. The villagers benefit from providing rhino handicrafts, cultivating butterflies and working in agro-forestry. Their presence can affect the management of the Park. It is therefore desirable to improve their involvement in management, as in the RMPU and Marine Conservation Units. Villagers within the Park will be resettled outside it.

### 5: Ecotourism Management:

Tourism in the Park must be related continually and with discretion to the other programs with which it is integrated and on the success of which it depends.

## MANAGEMENT CONSTRAINTS

The forests of the eastern Gunung Honje area are under increasing pressure from agricultural encroachment and settlement in the Park, illegal logging and firewood collection from the heavily populated areas to the east. According to Ramono and Santiapillai (n.d.), the threat of rhino poaching remains serious. Other management problems include illegal commercial fishing within the Park's boundaries using dynamite and cyanide, collection of algae for agar production, and predation of turtle eggs from nesting beaches by monitor lizards and wild boar. Selamat Datang Bay and its coral reefs underwent siltation due to deforestation activities on Gunung Honje. But coral bleaching has proved a problem beyond the control of the Park authorities. Oil pollution from passing tankers remains a potential threat (Silvius *et al.*, 1989; J. Thorsell, pers. comm., 1991).

## STAFF

There were 132 employees in 2002, 102 field staff, mostly rangers and 30 in administration. These included the Park Director with three section heads and community liaison staff. This number is considered inadequate. Some 12 manned ranger stations are located at key points within the Park. Radio communication and coastal patrol boats are used by the Coastal Patrol.

## BUDGET

The central government which takes all the revenue from entry fees, is the main source of funding. But this has fluctuated with general economic conditions between Rp2 to 2.5 thousand million per year (US \$225,000-300,000).. The budget in 1994 was Rp1,147,757,000 (M.Clarbrough, pers.comm.). Park management has been supported in the past by the WHF (US\$60,000 in the 1990s), WWF-Indonesia, the New Zealand government, the IRF. Wetland International and Minnesota Zoo, USA. The UNESCO/UN Foundation/UN Environmental Programme/RARE projects have funded much work with the communities.

## LOCAL ADDRESSES

Balai Taman Nasional Ujung Kulon, Jl. Perintis Kemerdekaan 51, Caringin, Labuhan 42264, Indonesia.  
Regional Office of Nature Conservation II, Jl. Raja H. Mena No. 1/B, Tanjung Karang, Lampung, Sumatra, Indonesia.

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

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