

World Heritage Sites

Protected Areas and World Heritage



VIRUNGA NATIONAL PARK DEMOCRATIC REPUBLIC OF THE CONGO

Virunga National Park contained within 790,000 hectares the greatest biological diversity of any park in Africa: from steppes, savannas and lava plains, swamps, lowland and montane forests to volcanoes and the unique giant herbs and snowfields of Rwenzori over 5,000m high. Thousands of hippopotamuses lived in its rivers, its mountains are a critical area for the survival of mountain and lowland gorillas, and birds from Siberia overwinter there.

Threats to the site: The Park was placed on the List of World Heritage in Danger in 1994 after civil war in Rwanda and the influx of 1.5 to 2 million refugees into Kivu province. This led to massive uncontrollable poaching and deforestation: 9,000 hippopotamus were killed; fuelwood cut for refugee camps was estimated at 600 metric tons/day, depleting and erasing the lowland forests. The staff lacked means to patrol the 650 km-long boundary, were often unpaid, and between 1996 and 2004, 105 out of the Park ranger force of 500 men were killed. The north and centre of the Park were abandoned, and protective soldiery turned to poaching. Fishing villages on Lake Edward threaten the integrity of the Park. The 2002 eruption of the stratovolcano Mt. Nyiragongo above Goma, added greatly to the difficulties caused by civil war.

In 1996, the World Heritage Committee recognised that major effort would be needed for at least ten years after this tragedy to rehabilitate and restore management of the Park and regain local support for its conservation. The UNHCR and other agencies in charge of refugee camps sited within and on the edges of Virunga were contacted and the government informed of the Committee's wish to help the IUCN and world institutions by providing training and technical assistance to deal with the threats to the Park. The government is supportive but its army pillages the Park. In 2006 many of the high mountain gorillas still survived, but hippopotamuses were again massacred, all other species of economic value had been drastically reduced and tourism stopped. In 2007-8 the Park remained a besieged island in a sea of subsistence cultivation and outbreaks of heavy fighting have once again threatened the gorillas, twelve of which were murdered in 2007, the refugees and the Park staff.

COUNTRY

Democratic Republic of the Congo

NAME

Virunga National Park

NATURAL WORLD HERITAGE TRANSBOUNDARY SERIAL SITE IN DANGER

1979: Natural World Heritage Site, inscribed under Natural Criteria vii, ix and x.

1994+: Listed as a World Heritage site in Danger because of civil conflict, invasion and degradation.

STATEMENT OF OUTSTANDING UNIVERSAL VALUE

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

Statement of Significance

Virunga National Park is notable for its chain of active volcanoes and the greatest diversity of habitats of any park in Africa: from steppes, savannas and lava plains, swamps, lowland and Afroalpine forests, to the unique Afroalpine vegetation and icefields of the Rwenzori mountains, which culminate in peaks above 5000m. The site includes the spectacular Ruwenzori and Virunga Massifs, including Africa's two most active volcanoes. The great diversity of habitats harbours an exceptional biodiversity, including endemic as well as rare and globally endangered species, such as the mountain gorilla.

Criterion (vii): Virunga National Park presents some of the most dramatic mountain scenery in Africa. The rugged Ruwenzori mountains with their snowcapped peaks and steep slopes and valleys and the volcanoes of the Virunga Massif, both with Afroalpine vegetation with giant heathers and Lobelias and densely forested slopes, are areas of exceptional natural beauty. The active volcanoes, which erupt every few years, form the dominant landforms of the exceptional scenery. The park contains several other spectacular landscapes such as the erosion valleys of the Sinda and Ishango areas. The park also contains great concentrations of wildlife, including elephants, buffalo and Uganda kob, and the highest concentration of hippopotamus in Africa, with 20,000 individuals on the shores of Lake Edward and along the Rwindi, Rutshuru and Semliki rivers.

Criterion (viii): Virunga National Park is situated at the heart of the Albertine Rift sector of the Great Rift Valley. In the southern section of the park, tectonic activity resulting from crustal extension of this area gave rise to the Virunga Massif, composed of eight volcanoes, of which seven are situated or partly situated in the park. These include Africa's two most active volcanoes, Nyamuragira and the neighbouring Nyiragongo, which alone account for two-fifths of the historical volcanic eruptions on the African continent. They are especially notable because of their highly fluid alkaline lavas. The activity of Nyiragongo is globally significant for its demonstration of lava lake volcanism, with a quasi-permanent lava lake at the bottom of its crater, periodic draining of which has been catastrophic to the local communities. The northern section of the park includes around 20% of the Ruwenzori Massif, the largest glaciated area in Africa and the only truly alpine mountain range on the continent, and adjoins the Ruwenzori National Park World Heritage Site in Uganda, with which it shares Mount Margherita, the third highest peak in Africa (5109m).

Criterion (x): Due to its variation in altitude (ranging between 680m and 5109m), rainfall and soils, Virunga National Park contains a very high diversity of plants and habitats, resulting in the highest biological diversity of any national park in Africa. More than 2000 higher plants have been identified, of which 10% are endemic to the Albertine Rift. Approximately 15% of the vegetation are Afromontane forests. The Albertine Rift has also more endemic vertebrate species than any other region of mainland Africa, an important number of which can be found in the park. The park harbors 218 mammal species, 706 bird species, 109 reptile species and 78 amphibian species. The park is home to 22 species of primates, including three great ape species (mountain gorilla *Gorilla beringei beringei*, eastern lowland gorilla *Gorilla beringei graueri* and eastern chimpanzee *Pan troglodytes schweinfurthi*), with one third of the remaining mountain gorilla population in the world. The savanna areas of the park are home to a diverse population of ungulates, with one of the highest biomass densities of wild mammals ever recorded on Earth (314 tonnes/km²). Ungulates include the rare Okapi (*Okapi johnstoni*), endemic to the DRC, and the Ruwenzori duiker (*Cephalophus rubidus*), endemic to the Ruwenzori mountains. The park contains significant wetland areas, particularly important as wintering grounds for Palearctic bird species.

INTERNATIONAL DESIGNATION

1996: *Parc National des Virunga* designated a Wetland of International Importance under the Ramsar Convention (800,000ha).

IUCN MANAGEMENT CATEGORY

II National Park

BIOGEOGRAPHICAL PROVINCE

Central African Highlands (3.20.12).

GEOGRAPHICAL LOCATION

In north-eastern Democratic Republic of the Congo, along 300 kilometers of the border with Uganda and Rwanda, between the north end of the Ruwenzori Mountains, including two-thirds of Lake Édouard (L. Rutanzige) and reaching almost to Lake Kivu, between 0° 55'N to 1° 35'S and 29°10' to 30° 00'E.

DATES AND HISTORY OF ESTABLISHMENT

1929: Established as an extension of the Albert National Park, founded in 1925, the first in Africa;

1969: Revised by Decree 69-041 as Virunga National Park, excluding a part which became the *Parc National des Volcans* in Rwanda;

1994+: Listed as endangered because of invasion by great numbers of war refugees, unauthorised armed militia and settlers, with subsequent massive poaching, illegal fishing, deforestation and cattle grazing;

1996: Designated a Ramsar Wetland site.

LAND TENURE

Government, 95% in North Kivu and Orientale Provinces. Administered by the *Institut Congolais* (formerly *Zairois*) *pour la Conservation de la Nature* (ICCN).

AREA

790,000ha (UNESCO, 2008 gives 800,000ha). Contiguous with four Ugandan national parks: in the north for 10km with Semliki National Park (22,000ha) and for 45km with the Rwenzori Mountains National Park (99,600 ha), which is also a World Heritage site, in the east, across Lake Edward, for some 55km with the Queen Elizabeth National Park, and in the south for a few kilometers with Mgahinga Gorilla National Park (2,900ha); also in the south for 50km with the *Parc National des Volcans* in Rwanda (15,000ha). These are all potential elements of a transboundary park.

ALTITUDE

680m in the north, 916m at Lake Edward to 4506m on Mt. Karisimbi in the Virunga Mts and 5,119m in the Mt. Margherita peak of Mount Ngaliema (Mt. Stanley) in the Rwenzori range.

PHYSICAL FEATURES

The Park lies in the western (Albertine) rift valley and on the adjacent mountains. It includes five main biomes: the forested granitic Rwenzori and volcanic Virunga massifs, lowland forest, savanna, and swamp-edged lake. The area in the Virungas comprises the flanks of six volcanoes: Mts Karisimbi, Mikeno, Visoke, Sabinyo, Nyiragongo (3,469m) and Nyamaragira (3,058m), the last two both having erupted over 30 times since 1882 and are still very active. Nyiragongo is a stratovolcano with a very liquid lava lake. Its eruption in January 2002 destroyed 14 villages and an estimated 15% of the centre of the town of Goma on Lake Kivu to its south. Nyamaragira to its north is a shield volcano which erupted twice later that year, in 2006 and again in early 2010, the lava flowing to the northeast. The steep western face of the Rwenzoris is glaciated and shares the third (Mt Ngaliema), fourth and fifth highest mountains in Africa with Rwenzori National Park in Uganda. The centre of the Park is occupied by the 400,000 ha Lake Edward (Rutanzige). All of the Park's waters flow into the Nile system through Lake Albert except for the Lake Kivu drainage which flows to the Congo. Biotopes include lakes at various elevations, marshy deltas and peat bogs, hot springs (at Mayamoto) and saline soils in the Rwindi plains, steppes, savannahs and lava plains, lowland equatorial forest, dry and transitional forests, high montane forests, and alpine heath in the Rwenzori. The whole length of the Park is bordered to the west by unprotected but species-rich forested mountains.

Administratively the Park is divided into three sectors:

North: half the forested Semliki valley north of Lake Edward, with much of the western half the Rwenzori range to its east;

Central: two-thirds of the shores and waters of Lake Edward and most of the lowland valley swamps and savannas of the Rwindi, Rutshuru and Ishasha rivers to its south; and

South: the Nyamaragira - Nyiragongo lava plateau and the northwestern fifth of the volcanic Virunga massif, shared with Rwanda.

CLIMATE

The areas of lowest and highest rainfall in the DRC are found in Virunga National Park less than 75 kilometers apart. Rain falls all year but more heavily from March to May and mid-September to mid-December, with drier spells following each period. Annual rainfall averages 500mm at Lake Edward, 900-1500mm on the plains south of the lake, decreases higher on the volcanoes but on the west slope of the Rwenzoris, orographic precipitation is over 3,000mm. These mountains have heavier snowfall than Mounts Kenya or Kilimanjoro, are permanently ice and snow-covered and carry small retreating glaciers. Their 4000m altitudinal range results in marked climatic variations with a consequent diversity of habitats. The mean annual temperature in the lowlands is between 20° and 23°C with a 12°C diurnal range (Delving *et al.*, 1990).

VEGETATION

The region, originally a vast forest refuge for innumerable species, was largely deforested during the 20th century but still has the greatest diversity of habitats of any park in Africa, from steppes to icefields. It lies

within a WWF/IUCN Centre of Plant Diversity. The Park borders several biogeographical zones and covers three major habitat types: open grassland, lowland closed and humid montane forests (15% of the vegetation), with savannas, lava plains, swamps and unique Afroalpine vegetation. Within this very wide variety of habitats grow more than 2000 recorded species, 10% of which are endemic to the Albertine Rift (Delvingt *et al.*, 1990; UNESCO, 2007). The following is based on the 1980 IZCN Biosphere Reserve submission to UNESCO.

The open land habitats grade from steppe to savanna to swamp, the result of low rainfall, soil type, grazing and fire. 1): grassy *Chrysochloa orientalis* steppe to bushy steppe with *Carissa edulis*, *Capparis tomentosa*, *Maerua* spp. and *Euphorbia candelabrum*; 2): low savanna with *Themeda triandra* and *Imperata cylindrica*; 3): grassy savannas of three types - *Pennisetum* in the Semliki valley, *Cymbopogon* on the plains around the lake and *Hyparrhenia* in the far north; 4): bushy savannas - *Combretum*-wooded *Hyperthelia dissoluta* savanna and *Acacia seiberiana-A.gerrardii* woodland, both on the Mitumba foothills west of the lake; 5): transitional grasslands - *Craterostigma nanum* prairies and *Sporobolus* spp. savanna; 6): riverine grasslands - *Cyperus papyrus* marsh, *Phragmites australis* marsh; and 7): aquatic vegetation.

Forest habitats grade from thickets to dense forests. 1): thickets around Lake Rutanzige and on Mt. Misali; 2): thick sclerophyllous forest of *Euphorbia dawei* in the southwest; 3): lava plain pioneer species in all stages of recolonisation, culminating on loose soils in *Neoboutonia macrocalyx* forest; 4): dense equatorial forest over half the northern sector; 5): gallery forests - shade-loving forest on the upper Rwindi, a fringe of *Phoenix reclinata* on the lower Rutshuru and drier forests on the upper Semliki; 6): dense montane forest from 1,800 to 2,300m on Rwenzori and on Mt. Tshiaberimu west of the lake, on Mt. Kasali south of the plains, on Mt. Kamatembe in the southwest and on the Virunga massif between 1,750 and 2,600m.

Montane habitats grade from transitional foothill forest to alpine zones. 1): *Arundinaria alpina* bamboo woodland on the slopes of all the larger mountains; 2): *Hagenia abyssinica* woodland becoming bushy, mixed with large hardy perennials like *Peucedanum kerstenii*; 3): a high scrub layer, then tree heath of *Erica* and *Philippia* species, associated on the Virungas with *Podocarpus latifolius*, on Rwenzori with *Hypericum ruwenzoriense*, *Hagenia abyssinica* and *Rapanea rhododendroides*; and a low and grassy understorey layer; 4): afro- alpine groves of *Senecio stanleyi* with giant *Lobelia wollastonii* in clearings; 5): sparse vegetation above 4,300m mainly of lichens and spermatophytes, although grasses have been found growing over 5,000m.

FAUNA

Before the civil war some of the largest wild animal concentrations in Africa lived in the grasslands along the rivers of the Park. There were 218 species of mammals, 23 of them nationally threatened (Delvingt *et al.*, 1990). The savannas support elephant *Loxodonta africana* (VU) in the southern plains - 3,000 in 1960, 674 in 1971, 500 in 1988 according to Verschuren (1988) and at least 486 in 1998 (Barnes *et al.*, 1998); but the elephant population is said to have fallen by 90% in the last 20 years (Anon., 2010) Hippopotamus *Hippopotamus amphibius* (VU: 33,000 in 1986 down to 3,000 in 1996, were essentially eliminated by late 1996 (BRD, 2000; Hart & Mwinyihali, 2001). The 22 species of primate include owl-faced monkey *Cercopithecus hamlyni* (VU) and L'hoest's monkey *C. l'hoesti* (VU) Leopards *Panthera pardus* are widespread though few and little seen but lions *Panthera leo* (VU) may have increased in numbers. There are desert warthog *Phacochoerus aethiopicus*, numerous antelope including kob *Kobus kob thomasi* and Defassa waterbuck *K. defassa*, the endemic Ruwenzori red duiker *Cephalophus nigrifrons rubidus*, and central African savanna buffalo *Syncerus caffer aequinoctialis*. Some of the wildlife on Mts. Nyiragongo and Nyamuragira was affected by the eruptions in 2001.

Mountain gorillas *Gorilla gorilla beringei* (CR) live on the slopes of the Virunga Mountains where transboundary cooperation and tourist revenue have ensured their protection. Out of a total mountain gorilla population of 630 animals, about 140 were recorded there in 1980 and 279 in 1986 (Verschuren, 1988). Between 1989 and 2001 their numbers increased from 320 to 355 owing to efficient patrolling (IUCN, 2001). In 2003 a survey by most of the agencies closely concerned with the mountain gorilla populations in Rwanda, the DRC and Uganda determined that there were 380 animals present (Fauna & Flora, 2004), and by 2009 there were 420, 213 of them in the Mikeno area in the World Heritage site (Nelleman *et al.*, 2009; Wildlife Direct, 2009). About 20 eastern lowland gorillas *Gorilla g. graueri* (EN) live

on Mount Tshiaberimu northwest of the lake, threatened by illegal farmers and tree fellers (Gorilla Org., 2007). Populations of eastern chimpanzees *Pan troglodytes schweinfurthii* (EN) exist in the Watalinga forest in Rwenzori National Park (645 in 2005; CMS/GRASP) and in southern parts of the Park (578 in 2005; Plumtre) and some 30-40 in the southern lava field forest of Tongo. There are three species of pangolin, giant ground pangolin *Smutsia gigantea*, African white-bellied *Phataginus tricuspis* and black-bellied *Uromanis tetradactyla* and populations of the near-threatened okapi *Okapia johnstoni*, topi *Damaliscus lunatus* and eastern bongo *Tragelaphus e. euryceros*.

The Park lies within one of the world's Endemic Bird Areas (Stattersfield *et al.*, 1998) and the avifauna is very diverse: 706 species are recorded, 24 being endemic to the Virungas (Delvingt *et al.*, 1990; Fishpool & Evans, 2001). There are large numbers of pelicans on the lower Rutshuru river. The wetlands include shoebill *Balaeniceps rex* (VU), herons, ibis, egrets, bitterns, duck, geese, darters, cormorants, skimmers, openbills, ospreys, gulls, francolins, warblers, the papyrus gonolek *Laniarius mufumbiri*, the papyrus yellow warbler *Chloropeta gracilirostris* (VU) in the far north, and weavers. Rare birds in the volcanic highlands are Grauer's swamp warbler *Bradypterus graueri* (EN) in highland swamps, yellow-crested helmetshrike *Prionops alberti* (VU) and Rockefeller's sunbird *Nectarinia rockefelleri* (VU) in bamboo, forest and heath stream thickets; in the Ruwenzori mountain forests, northern double-collared sunbird *Nectarinia preussi* and Shelley's crimsonwing *Cryptospiza shelleyi* (VU) in the bamboo and alpine zones. Notable mountain forest birds are dwarf honeyguide *Indicator pumilio*, Grauer's cuckoo-shrike *Coracina graueri*, Rwenzori turaco *Ruwenzorornis johnstoni*, Kivu ground-thrush *Zoothera tanganjicae* and the handsome francolin *Francolinus nobilis*; also Turner's eremomela *Eremomela turneri* (EN), Bedford's paradise-flycatcher *Terpsiphone bedfordi*, Lagden's bush-shrike *Malaconotus lagdeni* and forest ground thrush *Zoothera oberlaenderi* in lower forests.

109 species of reptile and 78 amphibians have been recorded. The monitor lizard *Varanus niloticus* and snakes are common, including python *Python sebae*, puff adder *Bitis arietans*, blacknecked cobra *Naja nigricollis*, and green mamba *Dendroaspis jamesoni* (Delvingt *et al.*, 1990). Crocodiles *Crocodylus niloticus* have recently returned to the upper Semliki river. Lake Edward is shallow and its fish fauna is impoverished, but it has many cichlid species, and it is quite rich in invertebrates. The loss of more than 30,000 hippopotamus in the past few decades has resulted in a reduced fish catch, since the lake is no longer receiving the hundreds of tons of nutrients which they used to contribute every day (WWF, 2003).

CONSERVATION VALUE

The Park has had the greatest biological diversity of any park in Africa and was designated a WWF Global 200 Freshwater Eco-region and a Ramsar Wetland. It ranges from swamps and steppes, lava plains and savannas, dense lowland and higher bamboo forests to the snowfields of Rwenzori, and the volcanoes of Virunga with a correspondingly very wide array of flora and fauna. It was a refuge for hippopotamuses, mountain and lowland gorillas, and the highlands have notable examples of the high altitude giant herbs unique to the mountains of Africa.

CULTURAL HERITAGE

Little information is available, but the oldest stone tools in the world are said to have been found along the shores of Lake Edward.

LOCAL HUMAN POPULATION

There was virtually no human population except for some Batwa pygmy hunters when the Park was created, but a population explosion occurred in the late 1950s. Because of its fertility and cool, malaria-free climate, Kivu is now the most densely populated province in the country, with over 300 inhabitants per sq.km (Biswas *et al.*, 1996). Local tribes such as the Banande who live in the foothills of the Rwenzori settled on the Park borders. Some 60% of the Park's boundaries are now densely populated. Small administrative posts and villages of the past have become large towns and are sometimes populated by outsiders, for example, the Bakiga from Uganda who poach but have never officially occupied Park territory (Verschuren, 1988). Within the Park are three lakeside fishing villages, Kiavinonge, Nyakakoma and Vitshumbi, where a population of 20,000 grew to 35,000 from 1988 to 1993. During and after the wars, 600,000 Rwandan refugees were housed in camps in or bordering the Park (Biswas *et al.*, 1996).

The country-wide civil war has also led to a continual massacring of the people, hundreds of thousands of refugees, lack of employment and extreme poverty, together with depredations and poaching by militia groups such as the *Mai-Mai* and by underpaid government soldiers seeking food continue to contribute to the Park's degradation (Anon., 2010). However, by 2010 30% of the gorilla tourism revenue was being redistributed to social projects such as a school and clinic in Rumangabo which gained strong support (UNESCO, 2010).

VISITORS AND VISITOR FACILITIES

On its opening, the Park was the country's main tourist attraction. More than 5,000 people visited the Park at Rwindi in 1998 tourists numbered 8-10,000 a year, contributing a major source of revenue. There was accommodation at Rwindi and Djomba, Mabenga and Kibati. However, since the war in 1996, the Park's infrastructure was destroyed and after 1998 sightseeing in the area and gorilla-viewing both stopped. However, the gorillas, the remaining animal aggregations and the volcanoes remain strong attractions. Conditions allowed tourism to resume in 2004, later including trips to view the volcanic lake in the crater of Mt. Nyiragongo. In 2009 600 tourist visits were registered (UNESCO, 2010).

SCIENTIFIC RESEARCH AND FACILITIES

The Park was set up primarily for scientific research during Belgian rule. Much detailed work done on specific taxa, from insects to mammals, particularly in the 1930s and 1950s, largely by Belgians. An influential study was published by G. Schaller in 1963. Censuses of the gorilla population, funded by WWF, the New York and Frankfurt Zoological Societies in 1986 showed their numbers were beginning to climb. They recommended international co-operation to improve protection over all three neighbouring parks. The UNHCR led a satellite imagery study of deforestation during 1987-1995 (IUCN, 1995). Several other studies have been abandoned and the field station at Lulimbi on the lake is now in ruins, but aided by the Rwandan army, a census of the mountain gorillas was made in 2001 (Hart & Mwinyihali).

MANAGEMENT

An 'integral conservation policy' has been in operation for over 50 years but the Park has no management plan. Savanna fires, which maintain the fire-climax vegetation, have been managed in the past by the park authorities. The IUCN and WWF surveyed the gorillas to provide data needed to improve their preservation and the protection of their habitat. There were major ranger camps at Rwindi (central sector), Rumengabo (southern sector) and Matsura (northern sector) and approximately 50 guard posts throughout the park. The Park was managed from Kinshasa and Goma by the IZCN (later ICCN), an agency of parastatal status but institutionally weak (as discussed by Verschuren, 1988). Since 1990 the Park has been under siege from the surrounding and refugee populations and increasingly difficult to control, although the Southern sector, owing to good relations between the military and Park authorities and the help of the International Gorilla Conservation Program (IGCP), has been less ravaged than the rest (IUCN, 2002).

Between 2000 and 2004 the UNESCO/ICCN project 'Biodiversity Conservation in Regions of Armed Conflict' was funded by the UNF and the Belgian government; Since 2002 the Great Apes Survival Project (GRASP) has focussed international attention and funding towards the survival of all these apes: in 2004 Virunga benefited from funds for the wall delineating the Park from encroachment by Rwandan farmers (GRASP, 2004). Dialogue with the locals about conservation has had some success (BRD, 2003) but nothing can replace effective patrolling. Phase II of the UNESCO/IUCN project continued in 2006 focussing on Emergency Action plans to reinforce the management of the Park. In 2008 the need remained to disarm, reduce or evacuate the armed groups and military positions inside the property, including the Nyaleke army reunification and training camp. The Ministry of Mines' mining concessions inside the property should be revoked; and charcoal production stopped. Illegal civilians should be evacuated peacefully and helped to return to their region. Profits such as from gorilla tourism, should be shared with the local communities in order to improve the Park's relations with them; law enforcement should be strengthened and Park staff given training to improve their efficiency and a joint plan is needed to strengthen cooperation between the Park management, ICCN, and its partners (IUCN, 2008).

MANAGEMENT CONSTRAINTS

Since the Rwandan civil war 1990-1994 and the civil unrest in former Zaire from 1996 onward, some 1.5 to 2 million Rwandans took refuge in the country, about half of them near Goma, bringing the war into Zaire. The northern and north central sectors came under the control of two splinter RCD groups later merged with the Ugandan army-backed *Front de Liberation du Congo* (FLC). Between July 1994 and September 1996, the southern sector of the Park came under the control of the Rwandan RCD Goma (*Rassemblement Congolais pour la Democratie*). The war was superimposed on a population already under stress. The Park is densely surrounded by a very poor and widely unemployed population which covets its potential agricultural land and was said to be encroaching on its land at the rate of 2 square kilometres a day (K. Toepfer, reported, 2004). The local people are strongly opposed to the Park authorities. Its staff are unpaid, have little equipment, low motivation and low morale (IUCN, 2002). So the surrounding population is free to plunder the Park of every resource, underselling legal products. GTZ (the German NGO) by importing plantation wood and distributing energy-efficient stoves around the camps may also have saved some 40 sq.km of park forests between 1994 and 1996.

Some 95% of its boundaries are now in densely cultivated land and in many places no longer clearly marked. The increasing pressure of population and scarcity of land has exacerbated ethnic discord and disrupted animal migration patterns (Kakira, 1995). Conflicts between scavenging animals and people's crops intensified. Conflict with the soldiery, poaching, encroachment and cattle farming in the Park became rampant. Five refugee camps were sited in or beside the Park in the 1990s by UNHCR and other NGOs without regard to the environment. Commercial exploitation of its resources was even encouraged by some NGOs on humanitarian grounds (Biswas *et al.*, 1996; Sanders, 1994). Devastation was less where protection was started at the same time as the camps (Hart & Hart, 1997; Henquin & Blondel, 1997). The Director of ICCN was reported to have said there was almost no coordination between the many NGOs, resulting in waste of money and effort (Zeller, 2005).

Both central and northern sectors of the Park are dominated by the militia of two governments and the *Mai-Mai* dissidents from the Rwandan *Interhamwe* which live off poaching. Invaded by over 20,000 families, these sections were almost abandoned to the invaders. Much of the great Semliki forest has been virtually destroyed. As early as 1995 the Conservation Service had evacuated 3,000 people from the northern sector of the park and it had become dangerous to patrol. Being unarmed, rangers required military escort to make patrols at all. Many staff were not paid for several years and had no way of patrolling the 650 km-long boundary (Vwirasihikya, 1995). In October 1996 rebel Zairean forces controlling much of eastern Zaire launched an offensive to take over the Government. Militia groups became active throughout the area. Many guns abandoned by fleeing soldiers fell into the hands of poachers or local people, greatly endangering the lives of the few remaining Park personnel who attempted to stop the destruction. Poaching by hostile armed soldiers, government staff and Ugandan militia took elephant, hippopotamus, buffalo, okapi and monkeys. Most of the Park's infrastructure was looted or destroyed and links with Kinshasa were broken. Since 1995, 44 park guards and 12 mountain gorillas had been killed and the hippopotamus population reduced by 90% in ten years (Biswas *et al.*, 1996). In 1999 they were being sold for \$10 a head. (BRD, 2000). Fish stocks and wildlife are under increasingly heavy pressure and large areas have been logged. However, funded by the UNESCO/DRC/UNF project, staff began to patrol the northern sector again.

45% of the central sector is now being used for coffee and tea cultivation, fuelwood, logging and housing. The fishing villages have grown so large they threaten the integrity of the Park and overexploit the fishery. Human and medical wastes were dumped in the Park and illegal gold mining also occurred. Fortunately the Park contains few valuable mineral resources. 2,500 families are massed along the Park's boundaries. Hima pastoralists have moved 3,500 head of cattle into the protected area. Concern for the Park, especially the recurring encroachments, increases in population along the borders, refugee-related problems and the destruction for profit of woodlands, elephants and gorillas led to the site's listing as World Heritage in Danger in 1994. Staff were unable to enter this sector along the west side of Lake Edward, which became of serious concern. (UNESCO, 2001, 2002; Hart & Mwinyihali, 2001).

In the southern sector at least 500 sq.km of the Park's lowland forest has been affected by woodcutting and uncontrollable poaching: wood cut by the refugees for fuel, charcoal and shelter was estimated at 600 metric tons per day. Chegera Island in Lake Kivu and other lakeside areas have been settled and

cultivated. Two years after the refugees arrived, 113 sq.km of the Park had been deforested, 71 sq.km being completely stripped and almost 5% of the gorilla forest habitat in Virunga had been affected (IGCP, 1997a & b; Henquin & Blondel, 1997; Biswas *et al.*, 1996; UNESCO, 1995). By 2001 it was said that more than 150 sq.km of forest had been cut down (Draulens & van Krunkelsven, 2002), and commercial exploitation of timber and game was widely practised by the Rwandan *Interahamwe* and *Mai-Mai* militias. The deforestation and encroachment for crops and grazing in the southwest of the Park has left the landscape too open to support its former population of large animals (IUCN 2003). By 2001 with the resumption of regular patrols the mountain gorilla population increased from 325 to 355. The International Gorilla Conservation Program is helping to restore links with staff in the other sectors (UNESCO, 2002). In the Mikeno sector, just north of the Rwandan border there is a tribal taboo on eating gorillas, although conflicts over crops remain, and 15 sq. km out of 250 sq.km of the sector were cleared for cultivation in 2004, only halted when adequate funds were granted by IGCP, the EU and FZS for building a 20 km low demarcation wall between Rwanda and the Park (GRASP, 2004). The military, under the orders of local politicians, have become complicit in, and even directly involved in, large scale poaching to supply bushmeat to the local populations (Zeller, 2005).

In 1999, major funding for equipment and salaries to all the World Heritage sites in the DRC from 2000-2004 was arranged by the World Heritage Foundation (UNESCO, 2000). In 2000 the Belgian government promised similar assistance (UNESCO, 2001). But by mid 2000 few UNF funds seemed to be reaching the field and a DRC Emergency Relief Mission of international NGOs was supplying equipment and creating public awareness of the damage (BRD, 2000). A report by I. Redmond was commissioned in 2001 by the Dian Fossey Gorilla Fund (DFGF) and others to protest the effect of the mining boom on the eastern lowland gorillas and other wildlife. He noted within the parks the drastic clearing of forests for fuel, charcoal, agriculture, construction and many settlements, continuous overhunting for meat, ivory and sale to collectors, destruction of the large animals and the maiming and disturbance of other wildlife. He also noted the needs to release funds to equip and pay guards, to coordinate the many NGOs and agencies concerned and for economic help to surrounding communities (Redmond, 2001). Another report by Hart & Mwinyihali in 2001 noted total destruction of the Park's hippotamus population and destruction of buffalo and antelopes. It noted that soldiers, dealers, army commanders and officials, local and foreign, were the main immediate beneficiaries of the plunder. Despite funding from abroad, only stronger commitment from the local authorities will ensure successful protection.

In April 2001, the UN Security Council released a report damning the trade in minerals from protected areas and its role in financing the Rwandan and Ugandan occupations. It cited the World Bank and Citibank as passive participants and named army and government officials in Rwanda, Uganda and Burundi profiting from it (United Nations, 2001). In May 2001, UNEP launched the Great Apes Survival Project (GRASP) to protect threatened primate species (UNEP, 2001). However, two thirds of the worst deforestation was in forests of the lava plain, which are relatively low in diversity and 50% of the areas stripped were of common second growth trees where the potential for regeneration is high. By 2002, serious encroachments from Rwanda again threatened the Park (UNESCO, 2002).

In mid 2004 some 6,000 would-be settlers clear-cut 1500 hectares of forest at the west end of the Mikeno sector. They were paid by Rwandan land speculators and ushered across by the Rwandan Defence Force (RDF) claiming to ensure security. International pressure ended the invasion but in late 2004, ranger posts throughout the Park were still being attacked by large groups of well-armed men and four rangers had been killed up to September that year (BRD, 2004). Altogether, between 1996 and 2004, 105 out of the 700-strong Park ranger force has been killed (Zajtman, 2004). The WHC has urged the DRC Government to station its army, including former rebel troops awaiting demobilization or integration into the army, a reasonable distance from the site, to evacuate all encroaching illegal settlements and to halt all illegal resource extraction (UNESCO, 2004). In late 2004, Rwandan pursuit of Hutu rebels over the border in the DRC re-ignited the civil conflict. Since then, the ICCN with WHC support voluntarily evacuated 70,000 people from the Park, in 2005 repatriating 300 Hima with 5,000 cattle to Uganda. But 90,000 people still live in the Park, 60,000 in Kiorirwe, and in 11 illegal fishing settlements on the shores of Lake Edward, overfishing the lake and expanding cropland over the essential wildlife corridor between the central and northern sectors of the Park. In 2006 local people continued to encroach on the Park for agriculture, cattle herding, illegal timber removal, charcoal production and illegal fishing. At least four armed groups poached bushmeat and looted the surrounding villages. 12,000 soldiers of the DRC army (Forces Armées de la RDC, FARDC) also poached, mined, and cut trees for charcoal. Together these were responsible for 80 percent of the poaching.

Nyaleke, an abandoned ICCN guard post in the Park, taken by the Ministry of Defence in 1998 for its largest camp, was rehabilitated for the retraining of local militia and army units and was still in existence ten years later. Currently, 4,200 soldiers with some 6,000 family members live there. Since January 2006 they received US\$10 a month from the U.N. Organisation Mission to the DRC (MONUC). However, most of the soldiery was not retrained and was often poorly disciplined, not fed and irregularly paid. So far, this issue has been too politically difficult for ICCN to tackle (UNESCO, 2006). Armed groups from the regular army, the national police, and former rebel troops awaiting reintegration still dominate the area, all brutally ravaging the civilian population. The Nyaleke army camp continued to exist and mining and oil exploration concessions were granted within the Park (UNESCO, 2008). In late 2007, continuing through 2008, an outbreak of heavy fighting between the Tutsi rebel army under General Nkunda and government troops inside the Park once again exacerbated the refugees' plight, destroying yet more villages and creating huge camps of displaced people. 10 or 12 gorillas were killed for meat and by charcoal burners clearing the forest. 14 elephants were killed in April 2008 alone. More than half a million people including 70 park rangers were displaced. These refugees camp next to the Park desperately looking for food, fuel and materials for shelters (Forest Conservation Portal, 2007; UNESCO, 2007).

After 2009 security improved. A FARDC-RDF operation cleared out the rebel Rwandan FDLR and a major *Mai-Mai* camp from south of Lake Edward. The Mikeno sector was secured and habituated gorilla numbers and tourists increased. But, as a result of the diminishing fishery, agricultural encroachment on the forests south of the lake and the making of charcoal increased. The Nyeleke camp still exists, and 5,000 Congolese soldiers remain camped in posts east of the lake and around the park. In early 2010, they killed four elephants two chimpanzees and four baboons within a month: being low-paid they poach for food while other poachers kill for the lucrative oriental ivory trade (UNESCO, 2010), 90% of the park's elephants are said to have been killed during the past two decades. At the same time the ranger force of 500 is to be halved, emphasising the need for aerial surveillance instead (Anon., 2010).

STAFF

There are three major ranger stations (Rwindi, Rumangabo and Mutsora) and two subsidiary stations. In 1980, the establishment was 3 senior staff with 3 researchers and 540 rangers. During the 1990s was disrupted the service; many of the staff were unpaid for years; they were also disarmed at the beginning of the war in 1996. By 2002, 18 senior staff with 463 rangers were being supported by UNESCO's UNF, but without sufficient arms (IUCN, 2003). To 2004, 105 rangers had been killed.

BUDGET

Initially the Park was subsidised with 600,000 zaires (US\$12,000) annually. From 1987 to 1991 the EEC with USAID granted US\$10 million. Visitors were an excellent source of revenue until the war, bringing in some US\$60,000 a year. In 1993 WWF gave an US\$6,220 anti-poaching grant for the northern sector and supported education and tree-planting programs. IGCP paid to protect the gorillas until UNHCR withdrew the funds to distribute them more evenly (UNESCO, 1998). However, in 1999 the WWF and DFGF (Dian Fossey Gorilla Fund) raised US\$30,000 to pay for staff and equipment, and the United Nations Fund promised US\$4,186,600, two-thirds of it outright, to compensate and pay staff of all five World Heritage sites in the DRC between 2000 and 2004 (UNESCO, 2000). In 2000 the Belgian government also promised US\$500,000 for the five DRC parks from 2001-2004 (UNESCO, 2001). According to Redmond, up to mid 2001, little UNF funding appears to have reached the rangers on site, eroding morale. Long-term funding was provided through the United Nations Foundation and the Government of Belgium program for the Conservation of the DRC World Heritage properties, for staff allowances, equipment, community conservation, monitoring and training, and efforts to address encroachment. The first phase (2001-2005) was US\$300,000; the second phase (2005-2008) of US\$300,000 was to finance an emergency action plan.

In 2004 donors, including UNESCO, UNF, U.S.A., Spain, Belgium and Italy, pledged \$40 million more for protection of the besieged parks (Zajtmán, 2004). In 2004 UNEP also granted \$50,000 towards the wall bounding the Mikeno sector (GRASP, 2004). In 2005-6 the WHF provided US\$64,848 for equipment and staff allowances. Long-term funding was provided through the United Nations Foundation and the Government of Belgium program for the Conservation of the DRC World Heritage properties, for staff allowances, equipment, community conservation, monitoring and training, and efforts to address

encroachment. Despite help from ZSL, FZS, GTZ, WCS, DFGF, IGCP, the EU, the Peace Parks Project and the WWF Virunga Environmental Program, funding was still insufficient for effective management of the Park.

However, in 2006 the World Bank listed several large long-term grants to specific sites under the Forest and Nature Conservation Program, several also applying to the region or surrounding areas. Recently US\$1,8million (shared with Salonga) was granted by the EU for management between 2005 and 2008, US\$ 3.55million by UNF (mainly from Belgium) for management during 2006-2009, US\$1million by SIDA (Sweden) for participatory management during 2007-2010, and some US\$6.1million was received by the region from 12 NGOs for core funding between 2007 and 2011. In 2007 US\$ 30,000 was granted by the Rapid Response Facility and US\$90,000 also provided by the French speaking community of Belgium to support development of alternative energy sources to charcoal (UNESCO,2008). Long-term grants included: US\$7million from GEF-3 to the Mikeno Sector (shared with Garamba) for rehabilitation of capacity building and participatory management 2009-2013; US\$20million from the EU for cross-border collaboration with Rwanda and Uganda 2009-2014; US\$80million from the African Development Bank shared between five Congo Basin forests, for institutional and community support, conservation & management; also a shared US\$20million from the ADB in a regional program from 2009 to 2015 (World Bank, 2006).

LOCAL ADDRESSES

M. le Président Délégué General, Institut Congolais pour la Conservation de la Nature (ICCN), Kinshasa/ Gombe, Ave. des Cliniques 13, BP 868, Kinshasa 1, Democratic Republic of Congo.

M. le Directeur, Institut Congolais pour la Conservation de la Nature, Parc National des Virunga-Lulimbi, BP 315, Goma, Democratic Republic of Congo.

M. le Conservateur Principal, Parc National des Virunga, Station de la Rwindi, Democratic Republic of Congo.

REFERENCES

The principal source for the above information was the original nomination for World Heritage status. Many scientific publications are obtainable through *L'Institut Royal des Sciences Naturelles de Belgique*, rue Vautier 29, B-1040 Bruxelles.

Anon (2004). Project updates. *Fauna and Flora*, April 6, pp. 12-13.

Anon. (2007). Virunga Under Attack. *Gorilla.cd*. Virunga National Park blog. March.

Anon. (2010). Crisis at Virunga National Park. *Bloody Ivory*, April.

Barnes, R.,Craig, G.,Dublin, H.,Overton, G.,Simons, W. & Thouless, C. (1998). *African Elephant Database 1998*. IUCN, Gland, Switzerland. 249 pp.

Bergorilla & Regenwald Direkthilfe (BRD) (2000). *Gorilla Journal*, June, 2000.

BRD (2003). *Gorilla Journal*, June, 2003.

----- (2004). *Gorilla Journal*, Sept., 2004.

Biswas, A. & Tortajada-Quiroz, H. (1996). Environmental impacts of the Rwandan refugees on Zaire. *Ambio* 25(6):403-408.

Bourlière & Verschuren, J. (1972). *Exploration du Parc National des Virunga*.

CMS/GRASP (2008). *Gorilla. Reports on Conservation Status*. Technical Service Publ.7. Royal Belgian Institute of Natural Science, Belgium/UNEP Nairobi.

Delvingt, W., Lejoly, J. & Mbaelele M. (1990). *Guide du Parc National des Virunga*. EEC, Brussels.

- Draulens, D. & van Krunkelsven, E. (2002). The impact of war on forest areas in the Democratic Republic of Congo. *Oryx*. 36 (1): 35-40.
- Fishpool, L. & Evans, M. (eds) (2001). *Important Bird Areas in Africa and Associated islands. Priority Sites for Conservation*. Pisces, Newbury/BirdLife International, Cambridge U.K.
- Forest Conservation Portal (2007). Gorillas threatened by fighting in Congo park. *Forest Conservation Archives*, October.
- GRASP (2004). Illegal clearing of the Virunga National Park halted. *GRASP Press Release*, August.
- Harcourt, A., Kineman, J., Campbell, G., Yamagiwa, J., Redmond, I., Aveling, C. & Condiotti, M. (1983). Conservation and the Virunga Africa gorilla *Gorilla gorilla beringei* population. *African Journal of Ecology* 21(2): 139-142.
- Harrison, J. (1993). *World Heritage Conservation Status Report*. WCMC Cambridge,
- Hart, T., Hart, J. & Hall, J. (1996). Conservation in the declining nation state: a view from eastern Zaire. *Conservation Biology*. 10(2): 685-686.
- Hart, T. & Hart, J. (1997). Conservation and civil strife: two perspectives from Central Africa. *Conservation Biology*. 11(2): 308-309.
- Hart, T. & Mwinyihali R. (2001). *Armed Conflict and Biodiversity in Sub-Saharan Africa: The Case of the Democratic Republic of Congo*. Biodiversity Support Program / WWF, Washington, D.C.
- Henquin, B. & Blondel, N. (1997). *Etude par Teledetection sur L'Evolution Recente de la Couverture Boisee du Parc National des Virunga*. EEC/UNHCR/IZCN.
- Hughes, R. & Hughes, J. (1992). *A Directory of African Wetlands*. IUCN, Switzerland/UNEP, Nairobi/WCMC, Cambridge, U.K.
- IGCP (International Gorilla Conservation Program) (1997a). Park suffers in civil war. *Mountain Gorilla Update* 3.
- IGCP (1997b). Democratic Republic of Congo. *Mountain Gorilla Update*. Issue 4.
- IUCN/WWF (1981). *Conservation of Gorillas*. Project 1941, IUCN, Switzerland.
- IZCN (1980). *Biosphere Reserve Nomination Form*. IZCN, Goma, Zaire.
- Kakira, L. (1995). The Virunga National Park grappling with the problem of population pressure: a case of human ecology. *Wildlife and Nature*. 11(2): 52-56
- Kalpers, J. (2001). *Impact de Dix Années de Conflits Armés sur le massif des Volcans Virunga*. Biodiversity Support Program / WWF, Washington D.C.
- Kalpers, J. et al. (2003). Gorillas in the crossfire: Population Dynamics of Virunga gorillas. *Oryx* 37(3): 326-337.
- Mertens, H. (1983). A new census of the larger ungulates of the Virungas National Park, Zaire. *Terre et Vie* 38(1): 51-64.
- Mubalama, L. (2000). Population and distribution of elephants (*Loxodonta africana africana*) in the central sector of the Virunga National Park, eastern DRC. *Pachyderm*, 28: 44-55.

Nelleman, C. et al.(eds) (2010). *The Last Stand of the Gorilla - Environmental Crime & Conflict in the Congo Basin*. UNEP, Nairobi/GRID, Arendal, Norway.

Plumtre, A. et al. (2010). *Eastern Chimpanzee (Pan troglodytes schweinfurthii). Status Survey & Conservation Action Plan 2010-2020*. SSC, IUCN, Gland, Switzerland.

Redmond, I. (2001). *Coltan Boom, Gorilla Bust. The Impact of Coltan Mining on Gorillas and Other Wildlife in Eastern DR Congo*. Report for the Dian Fossey Gorilla Fund Europe & the Born Free Found'n.

Sanders, C. (1994). *Environmental Impacts of Rwandan Refugees on the National Park of Virunga*. UNHCR, Goma, Uganda

Schaller, G. (1963). *The Mountain Gorilla: Ecology and Behavior*. Chicago: Univ.Chicago Press.

Stattersfield, A. et al. (1998). *Endemic Bird Areas of the World: Priorities for their Conservation*. BirdLife International, Cambridge, U.K.

UNESCO World Heritage Committee (1999). *Report on the 22nd Session of the Committee*. Paris.

----- (2000). *Report on the 23rd Session of the Committee*. Paris.

----- (2001). *Report on the 24th Session of the Committee*. Paris

----- (2002). *Report on the 25th Session of the Committee*. Paris.

----- (2003). *Report on the 26th Session of the Committee*. Paris

----- (2004). *Report on the 28th Session of the Committee*. Paris.

----- (2005). *Report on the 29th Session of the Committee*. Paris.

----- (2006). *Report on the 30th Session of the Committee*. Paris.

----- (2008). *Report on the 32nd Session of the Committee*. Paris.

----- (2010). *Report on the 34th Session of the Committee*. Paris.

UNESCO (2007). Renewed fighting threatens mountain gorillas in Virunga National Park. *World Heritage*, December.

Verschuren, J. (1988a). *Problèmes Scientifiques et Techniques au Parc National des Virunga (Zaire)*. Institut Zairois pour la Conservation de la Nature/Administration Générale Belge pour la Coopération au Développement. 135 pp.

----- (1988b). The impact of elephants and hippopotamuses on the habitat of the Virunga National Park, Zaire Chronological evolution of their populations. *Bulletin Institut Royal de Sciences Naturelles de Belgique Biologie* 57(0): 5-16.

----- (1991). Ornithological observations in Zaire, principally in the Virunga National Park. *Gerfaut* 81(3-4): 139-150.

Vwirasihikya, K. (1995). *Rapport sur l'Utilisation de Fonds UNESCO au Parc National des Virunga, Section Nord, Station de Mutsora*. IZCN, Epulu, Okapi Reserve, Zaire.

Wildlife Direct (2009).Mountain gorilla population in Virunga has increased by 12%. *Wildlife Direct News*.

Woods Hole Research Center (2005). *Mapping and Monitoring the Forests of Central Africa*, WHRC, Massachusetts, U.S.A.

World Bank (2006). *The Forest and Nature Conservation Program*. Project for WB, Washington, USA

Zajtman, A. (2004). The battle for D R Congo's wildlife. *BBC News*, Sept. 17. London.

Zeller, J. (2005). Democratic Republic of the Congo. 5-18 September, 2005. Report on a visit by the President of the International Ranger Federation. *Thin Green Line Newsletter of the IRF*.

DATE

1984. Updated 5-1990, 10-1995, 7-1997, 10-1998, 7-2002, 7-2003, 12-2008, 11-2010, May 2011.