

World Heritage Sites

Protected Areas and World Heritage



MOUNT NIMBA STRICT NATURE RESERVE GUINEA & CÔTE D'IVOIRE

The Mount Nimba range is a transboundary reserve between Guinea, Côte d'Ivoire and Liberia with an exceptional variety of habitats and biodiversity. It rises abruptly above the surrounding humid forest and savanna, covered by a layer of dense cloud-forest below mountain-top grasslands. The interlacing forest and grassland have a rich endemic flora and fauna, including unique or charismatic species such as viviparous toads and tool-using chimpanzees. Some of the range is composed of high-grade iron-ore. The Guinean and Ivorian portions of the Reserve are classified as a World Heritage site.

Threats to the Site: In 1992 the Guinean Reserve was threatened by (1) an iron-ore mining concession in the north granted to an international consortium, for which 1,550 ha was excised from the Site in 1993 as Guinea intended in 1981 when it nominated the area for inscription on the List of World Heritage, and (2) the massive arrival of Liberian refugees who invaded areas in and around the Reserve. The site was therefore placed on the List of the World Heritage in Danger. The mining project was put on hold around 1993 and refugee pressures subsided, but the Site remained listed in danger because of subsistence pressures: farming, hunting, uncontrolled fires, logging and grazing.

The Guinean government stated there had been an error at the time of the 1981 World Heritage nomination, and the area proposed for mining was not part of the Reserve. In order to ensure the site's integrity, in 1993 the government and the World Heritage Committee accepted the excision recommended by an expert mission led by the World Heritage Centre. In response to the Committee's concern about the impacts of mining, refugees and other threats, the Guinean government in 1995 established a Management Centre responsible for environmental and legal issues such as the region's water quality, socio-economic studies and integrated rural development. Further refugee movements occurred 2001-04 and iron ore exploration re-started in 2005. In 2010 the part of the World Heritage Site in Côte d'Ivoire was nominally re-integrated but was still in the control of rebels.

COUNTRIES

Guinea and Côte d'Ivoire

NAME

Mount Nimba Strict Nature Reserve

NATURAL WORLD HERITAGE TRANSBOUNDARY SITE IN DANGER

1981 & 1982: Inscribed on the World Heritage List under Natural Criteria ix and x.

1992+: Listed as a World Heritage site in Danger in 1992 due to the massive arrival of Liberian refugees and proposed iron ore mining. Since the mid 1990s it has been kept on the list due primarily to subsistence pressures and the intermittent presence of refugees.

STATEMENT OF OUTSTANDING UNIVERSAL VALUE [pending]

INTERNATIONAL DESIGNATION

- 1980: Mount Nimba Strict Nature Reserve designated a Biosphere Reserve under the UNESCO Man & Biosphere Programme with a total area of 17,130 ha and a core protected area of 10,000 ha;
- 1993: The Nimba Mountains Biosphere Reserve extended by three new strictly protected areas: an expanded Core Area (12,540 ha), the Déré Forest (8,920 ha) and the Bossou Hills (320 ha), plus a buffer zone (35,000 ha) and a transition area (88,280 ha) to a total area of 145,200 ha.

IUCN MANAGEMENT CATEGORY

1a Strict Nature Reserve

BIOGEOGRAPHICAL PROVINCE

Guinean Rain Forest (3.01.01) / West African Woodland Savanna (3.04.04).

GEOGRAPHICAL LOCATION

The Mount Nimba range is located at the intersection of the Republics of Guinea, Liberia and Côte d'Ivoire, at 7°32'N to 7°44'N and 8°20' W to 8°30' W.

DATES AND HISTORY OF ESTABLISHMENT

- 1943: A strict nature reserve was established in present day Côte d'Ivoire in French colonial West Africa as a *forêt classée*;
- 1944: The *Réserve Naturelle Intégrale* (Strict Nature Reserve - SNR) in present-day Guinea and Côte d'Ivoire, established by decree. The area of 17,130 ha included the Ivorian section, but excluded part of the Tuo ridge. Mining in the reserve may have been assumed to be possible;
- 1955: 2,160 ha added to the reserve by decree;
- 1980: The Guinean SNR area recognised as a Biosphere Reserve of 17,130 ha with the northern portion reserved for mining and the southern sector of 10,000 ha for conservation;
- 1981: The Guinean SNR inscribed on the World Heritage List;
- 1982: The Côte d'Ivoire SNR inscribed on the World Heritage List, making the total area 19,290 ha;
- 1992+: The World Heritage site (WHS) was listed as In Danger because invasion by refugees, proposed iron-ore mining, subsistence pressures and inadequate management;
- 1993: The WHS boundary was revised to 17,740 ha to exclude a 1,550 ha area of iron ore deposits included 'in error' in 1981; The Biosphere Reserve was enlarged to include the Forest of Déré and the Bossou Hills, a buffer zone and a transition area covering the upper Cavally River Basin in Guinea;
- 1995: The *Centre de Gestion de l'Environnement des Monts Nimba* (CEGEN) established by Decree 95/007/PRG/SGG to manage the portion of the site in Guinea, replacing direct management by the Guinean ministry responsible for the environment;
- 2001/2: Two tri-national meetings held to initiate more effective transboundary cooperation;
- 2002+: Western Côte d'Ivoire under rebel control, effectively halting management activity in the Ivorian portion of the WHS;
- 2005: The Guinean SNR's management agency's authority extended to cover the Simandou massif, becoming CEGENS.

LAND TENURE

Government, in Lola region. The Guinean section is administered by the *Centre de Gestion de l'Environnement des Monts Nimba et Simandou* (CEGENS) under the Ministry for Energy and the Environment. The Cote d'Ivoire section is administered by the *Office Ivoirien des Parcs et Réserves*, Ministry of Waters and Forests.

AREA

17,740 ha (18,000 ha UNESCO, 2008). The Guinean portion of the WHS is now 12,540 ha, and the Ivorian portion is approximately 5,200 ha. The overlapping and adjacent Biosphere Reserve of three strictly protected core areas totalling 21,780 ha, plus buffer zone and transition area covers 145,200 ha, all in Guinea.

ALTITUDE

450 to 1,752m (Mt. Richard-Molard).

PHYSICAL FEATURES

The Mount Nimba range is a 40 km-long narrow ridge running southwest to northeast, the northern three-fifths of which are in Guinea and Côte d'Ivoire and the remainder in Liberia. It is part of a mountain spine of PreCambrian bedrock, predominantly granites. Its grassy crest rises abruptly 1,000m above an undulating surrounding lowland plain. The range is a striking example of erosional processes. The sharp relief of the mountains with their grass-covered summits, precipitous slopes and flat open piedmont, is formed by a ridge of iron-quartzite emerging from softer metamorphic rocks. Weathering also left a gigantic sheet of hard iron-quartzite jutting out of the eroded piedmont schists and granite gneiss. This has formed hardcap crusts over the whole lowland plateau of the eastern and northern lowlands giving very poor soils, usually skeletal lithosols if present at all. These soil conditions explain the belt of savanna at 500-550m around the mountains above which elevation dense forest grows (Lamotte, 1983).

The Nimba Mountains have great topographical diversity, with valleys, plateaux, rounded hilltops, rocky peaks, abrupt cliffs, waterfalls and bare granite blocks; the whole area being a vast water catchment and reservoir. They are the source of 32 tributaries of the river Cavally (or Diougou) and of the Ya (or Nuon or Mami River in Liberia) which cut deep richly forested valleys. Before being legally classified as a Strict Nature Reserve in 2003, the Liberian southern two-fifths of the mountain range (not within the WHS) were heavily exploited for iron ore until 1992. The iron-rich quartzite underlying the range, especially the northernmost peaks of Pierré Richaud and Mt. Sempéré, contains an estimated 600 million tons of high quality (66+%) iron-ore. The headwaters of the Zougoué, Zié and Gouan Rivers originate in the area proposed for mining.

CLIMATE

Mount Nimba has a sub-equatorial montane climate subject to several influences. The south end of the range experiences the southwesterly monsoon from the ocean and the north end dry northeasterly harmattan winds from the desert. To seasonal changes are added two climatic gradients: altitudinal and along its length, also rain-shadowing, marked diurnal variations in temperature and a persistent daily belt of cloud above ~950m during the rainy season. The following relies on data from the Liberian sector (Coe, 1975). The mean minimum and maximum temperatures recorded are 14°C and 30°C respectively (17° and 23°C on the peaks). The mean annual rainfall is about 3000mm, but varies with elevation from ~1750mm at the base (1430mm at the north end) to ~3300mm on the peaks, and also with aspect, south and west-facing slopes being wetter than north-facing rain shadowed slopes. The wettest months are usually April to October (May to October on the peaks). There is pronounced variation, but rainfall is usually heaviest in August-September. January is the driest month with a mean rainfall of 20mm. Relative humidity in the mornings is 94% to 99%, dropping in the afternoon as much as 70-80%. A mean minimum of 18% is recorded in January and February when dry often heavily dust-laden winds blow from the desert. For much of the year, except during the dry season, a belt of dense cloud develops daily above 850m and hangs halfway up the mountain (Colston & Curry-Lindahl, 1986). Detailed accounts of the climate are given in Schnell (1952) and Adam (1983).

VEGETATION

Mount Nimba lies between the tropical forest and the West African savanna belt. It is part of an archipelago of peaks and plateaux, an isolated refugium covered by the Upper Guinean montane forest, which rises steeply above undulating lowland forest plains. It is known as a WWF/IUCN Centre of Plant Diversity mostly for its forests, although its distinctiveness is mostly in the montane grassland zone (White, 1983; IUCN/WWF, 1988; Wilson, 1991). There are over 2,000 species of vascular plants

with 16 considered strictly endemic to the region, described by Adam (1971-83), most of which are forest species. There are three major vegetation types: high altitude grassland with relict highland forest, piedmont edaphic savanna from 550-600m with gallery forest between 1,000m and 1,600m, and primary forest in the foothills between 600m and 1000m, all possessing a high diversity of plants.

The unique high altitude grassland or montane savanna is naturally occurring and is dominated by *Loudetia kagerensis* on the summits. Endemics include a fern, *Asplenium schnellii*, two flowering plants, *Osbeckia porteresii* and *Blaeria nimbana*, also *Dolichos nimbaensis*, and *Euphorbia depauperata*, found only on the mountain and in Ethiopia. On the slopes there are woody plants such as the regional endemic *Protea occidentalis*. The piedmont savanna is patchy, varying according to its degree of laterisation and pan-development; in places it is marshy overlying rock pavement. It supports a high diversity of herbaceous communities. Beyond these edaphic savannas is a wide plain covered with lowland forest.

The remnants of montane forest are likely to be dominated by *Mytaceae* species and the highest valleys by the tree fern *Cyathula cylindrica* var. *mannii*. The savanna is broken by gallery forests which extend up mountainside ravines between 1,000m and 1,600m. There is a change to sub-montane cloud forest around 900m and above 1,000m *Parinari excelsa* becomes dominant, with *Syzygium montanum* *Ochna* and *Gaertnera* spp. In these mid-altitude cloud-forests above 1,200m there are abundant lianas, epiphytes, ferns lycopods, lichens, fungi and mosses. There are 101 species of orchid, including an endemic to the mountain, *Rhipidoglossum paucifolium* (Lebbie, 2001). Drier semi-deciduous mid-altitude forests with trees such as *Triplochiton scleroxylon*, *Piptadeniastrum africanum*, and *Parkia bicolor* are found at the northern end of the range on the slopes more exposed to desiccating winds from the north and east. They are rarer than rainforests because of agricultural pressure, and some of the dry forest species have disappeared from many areas (Lamotte, 1983). The dense, moist, predominantly primary lowland forest is in the foothills and lower valleys especially in the south between 550m and 900m. The dominant species include *Lophira procera*, *Tarrietia utilis*, *Mapania* spp., *Chlorophora regia*, *Morus mesozygia* and *Terminalia ivorensis*. Secondary forest is found where land has been disturbed for slash and burn farming. Fragmentation and degradation of the area may also lead to invasion by exotic weeds, and a decline in those animal species which need undisturbed space to reproduce successfully.

FAUNA

More than 500 new species of fauna were described in the Guineo-Ivorian Mount Nimba Reserve, and more than 200 presumed endemic species were described from the Liberian end of Mt. Nimba (Curry-Lindahl, pers. comm., 1987). 317 vertebrate species are recorded of an exceptionally rich diversity because of the many habitats created by the interfingering grasslands and forests, and wide variety of microclimatic niches.

Mammals: Of the 55 species of mammals presently recorded, excluding bats (UNESCO/IUCN, 2007), there are several rare species such as Aellen's and Lamotte's roundleaf bats *Hipposideros marisae* (VU) and *H. lamottei* (CR). There are also small primate populations of diana monkey *Cercopithecus diana* (VU), West African red colobus *Procolobus badius* (EN), western pied colobus *Colobus polykomos* (VU), olive colobus *Procolobus verus*, potto *Perodicticus potto*, lesser bushbaby *Galago senegalensis* and West African chimpanzees *Pan troglodytes verus* (EN: ±450 in 2003; WHRC) which use tools and are close neighbors of the well-studied population in Bossou. Other mammals include greater cane rat *Thryonomys swinderianus*, giant ground, white-bellied and black-bellied pangolins *Smutsia gigantea*, *Phataginus tricuspis* and *Uromanis tetradactyla*, and Nimba otter shrew *Micropotamogale lamottei* (EN), a new genus discovered on Mount Nimba, spotted-necked otter *Lutra maculicollis*, African palm civet *Nandinia binotata*, African civet *Civettictis civetta*, Central African large-spotted genet *Genetta maculata*, servaline genet *G. servalina*, the rare Johnston's genet *G. johnstoni* (VU), Gambian mongoose *Mungos gambianus*, slender mongoose *Herpestes sanguineus*, leopard *Panthera pardus* and African golden cat *Caracal aurata*.

There is also an isolated population of the rock hyrax *Procavia capensis* as well as western tree hyrax *Dendrohyrax dorsalis*; and red river hog *Potamochoerus porcus*, desert warhog *Phacochoerus aethiopicus*, bushbuck *Tragelaphus scriptus*, black, bay, zebra and Maxwell's duikers *Cephalophus*

niger, *C. dorsalis*, *C. zebra* (VU) and *Philantomba maxwelli*, also forest buffalo *Syncerus caffer nanus*. Many of these are prey of Nimba's leopards (Lamotte, 1983). Information on the distribution, feeding and breeding of fifty-five mammal species is given in Coe (1975) and later information in Lamotte (1998). The pygmy hippopotamus *Hexaprotodon liberiensis* (EN) was said by Lamotte to be no longer found on the mountain in 1998 though the UNESCO/IUCN reactive report of 2007 states that hunters claim it is present in the nearby Déré Forest.

The forests contain more than 10 reptile and amphibian species including African giant toad *Amietophrynus superciliaris* and the Guinea screeching frog *Arthroleptis cruscolum* (EN) and *Cassina lamottei*. The most noteworthy endemic species is the Nimba toad *Nimbaphrynoides occidentalis* (CR) which occurs in montane grasslands at 1,200-1,600m and is one of the world's few tailless amphibians that is totally viviparous, an adaptation to xeric conditions. One of its four population centres is found in the present mining concession. The Liberian Nimba toad *N. occidentalis liberiensis*, (CR) is now classified as a distinct subspecies, found in the forest boundaries of the top of Liberian Mount Nimba, around the now abandoned pit of the Liberian-American Minerals Company (LAMCO) (Sandberger *et al.*, 2010). The endemic Mount Nimba reed frog *Hyperolius nimbae* (EN) is common but found only at the southeastern base of the mountain, in Cote d'Ivoire. Fish are abundant, especially below 500m: 15 families and 22 genera are found (Lamotte, 1998). 2,500 invertebrate species are recorded. In the uplands these include gastropod molluscs and many species of butterflies and of insects belonging to the *Carabidae*, *Gryllidae*, *Acrididae* and the *Forciculidae* (beetle, grasshopper, cricket and earwig) families, of which more than 20 are presumed endemic to the massif.

The Nimba Mountains lie within one of the world's Endemic Bird Areas (Stattersfield *et al.*, 1998). Their avifauna is very diverse, reflecting the diversity of topographic and climatic conditions, and a number of rare bird species occur, especially in the various types of forest. 72 species have been recorded as resident, but this must be a small proportion of what may exist on site (Wilson, 1991). These include the near-endemic white-eyed prinia *Prinia leontica* (VU), lemon dove *Aplopelia larvata*, rufous fishing owl *Scotopelia ussheri* (EN), Ghana cuckoo-shrike *Campephaga lobata* (VU), yellow-bearded bulbul *Criniger olivaceus* (VU), white-necked rockfowl *Picathartes gymnocephalus* (VU), Nimba flycatcher *Melaenornis annamarulae* (VU) grey-winged robin-chat *Cossypha polioptera*, Sharpe's apalis *Apalis sharpii*, and green-tailed bristlebill *Bleda eximius* (VU) (Lebbie, 2001; Fishpool & Evans, 2001). Birds in Liberian Nimba are described in detail in Coston & Curry-Lindahl (1986).

CONSERVATION VALUE

This area of dense Upper Guinean dense forest is part of one of the world's richest and most endangered ecosystems. The mountain is of great topographic diversity and of geologic and biological interest with its variety of habitats owing to the interpenetration of forest and grassland, the differences in substrates, altitude, microclimates and consequent vegetation types. It has an especially rich flora and fauna, with endemic species and is known as a Centre of Plant Diversity (IUCN/WWF, 1988). The mountain range lies within a Conservation International-designated Hotspot, is designated one of WWF's Global 200 Freshwater Ecoregions, lies within an Endemic Bird Area and an extensive UNESCO Biosphere Reserve.

CULTURAL HERITAGE

The mountain has some protohistoric archaeological interest as stone tools and chippings hewn from ammonites have been discovered in a rock shelter at the northern end (Lamotte, 1983).

LOCAL HUMAN POPULATION

There has probably never been any village on the mountains, which have been partly protected out of fear of resident spirits, but there is some vegetational evidence of former village sites, now overgrown, on the lower levels. Directly adjacent in Guinea and Côte d'Ivoire are approximately twenty-seven villages with around twenty-seven thousand inhabitants, mainly cultivators. Since 1990, population pressure has fluctuated following the influx and then departure of refugees from Liberia and Côte d'Ivoire.

VISITORS AND VISITOR FACILITIES

Tourism is formally prohibited within the strict nature reserves, but occurs on a limited basis and in the Bossou Hills, a Biosphere Reserve Core Area.

SCIENTIFIC RESEARCH AND FACILITIES

The mountain is one of the best studied sites in Africa. It has been well studied taxonomically, and geological, botanical and several zoological inventories have been completed. However relatively little information is available on the distribution of species and habitats or on their ecology.

A summary of the natural history of the Nimba range in Guinea, Côte d'Ivoire and Liberia is given by Curry-Lindahl & Harroy (1972) and a bibliography and other studies are given in Colston & Curry-Lindahl (1986). Descriptions of early work on Liberian Nimba are given in Coe & Curry-Lindahl (1965) and Curry-Lindahl (1965, 1968, 1969). The single most important work is probably that of Adam on the flora (1971-1983) while the Guinean and Côte d'Ivoire sections of Nimba are well known through a number of publications. The major works are by Leclerc *et al.* (1955) on the geography, Schnell (1952) on the montane vegetation, and on the fauna: Angel *et al.* (1954a; 1954b), Heim de Balsac (1958), Heim de Balsac & Lamotte (1958). Guibe & Lamotte (1958, 1963), Laurent (1958), Lamotte (1959), Aellen (1963) and Lamotte & Xavier (1972).

The Guinean government has organised various missions and training conferences together with UNESCO in order to redefine the problems of ecosystem protection (Lamotte, 1983; Pascual *et al.*, 1988 and Pascual *et al.*, 1989). These missions have added to scientific knowledge of the fauna (Lamotte, 1983) and flora (Fournier, 1987; Schnell, 1987) and soils. Since the 1960s the cognitive and social behaviour of tool-using chimpanzees at nearby Bossou has been studied by researchers from Guinea's universities and the Institute of Primatology, University of Kyoto (Sugiyama, 1979, 1981, 1984, 1990; Sugiyama & Koman, 1987; Sugiyama, Koman & Sow, 1988). More recently researchers from European and American universities have studied the ecology of the chimpanzees on the main mountain range.

More than 500 new species have been described or reported, including several mammals, one a new genus of otter shrew, more than ten amphibians and reptiles, several fish and arthropods, notably centipedes and harvestmen, and molluscs. Research includes phyto-sociological studies of high altitude grasslands, primate studies, and meteorological data. Whereas many species were described for the first time at Nimba, some of which are presumed endemic, they have not been searched for elsewhere.

There are twelve patrol stations in the Reserve which are used to monitor various environmental parameters. Since 1954, the Environmental Research Institute at Bossou (IREB) and the Nimba Scientific Station at Ziela have pursued scientific surveys in the area. The field research station of the Institut Français pour l'Afrique Noire (IFAN) is at the northern tip of the massif and has a long record of published research. In Liberia, the Nimba Research Laboratory operated from 1963 until the late 1980s, under the aegis of the IUCN Nimba Research Committee, partly funded by LAMCO.

Despite all these individual studies, baseline data for the area as a whole are missing. The mining company has therefore begun detailed vegetation mapping, climate monitoring, socio-economic studies and floral and faunal inventories of the range, concentrating in particular on Guinea. Several international research workers in the fields of biology, ecology, geography, primatology and meteorology are interested in the area. With appropriate facilities, scientific research on Mount Nimba could form the basis of a tropical ecology station of international importance.

MANAGEMENT

The great biological wealth of the northern 60% of the mountain range has been the object of strict protection since 1944, but the legal justification for this depends as much on its status as a strict nature reserve as on its designations as a Biosphere Reserve and World Heritage site by UNESCO. In 1995 responsibility for managing the Guinean portion of the site passed from direct control by the Ministry for Energy and the Environment to the Centre for the Environmental Management of Mount Nimba (*Centre*

de Gestion de l'Environnement des Monts Nimba, CEGEN), since 2005 also in charge of the Simandou massif (now "CEGENs"). It is responsible for all environmental and legal questions, for the monitoring of water quality, for integrated rural development and for socio-economic studies. The intent of the Guinean Government to clarify the legal status of the mining enclave and buffer zone has been explicit since 1993, and a decree was signed into law in August 2010, harmonizing the Guinean SNR boundaries with those of the Biosphere Reserve Core Area and the World Heritage Site (Guinean portion). The decree envisages zones for strict protection - the three Biosphere Reserve Core Areas - and areas managed for multiple uses - the Biosphere Reserve Buffer Zone and Transition Area. The Mount Nimba Pilot Project, financed by UNESCO, UNDP, the World Bank and the Japanese government, funded the production in 1995 of a Management Plan for the Biosphere Reserve but management plans for each section of the World Heritage site are still to be drawn up (UNESCO/IUCN, 2007).

Meanwhile Guinea had always been intended to mine the iron ore deposits in its portion of the mountains. As early as 1978 a 20-volume feasibility study was prepared for mining the high grade ore under the northern peaks, Pierré Richaud and Mt. Sempéré. There was always the intention to reinvest some of the profits in rehabilitating the mine site and improving the maintenance of the Reserve. From 1989 to 1991, UNDP, UNESCO and the Guinean government studied the impacts of opencast extraction and farming on the site, including research to expand knowledge of its extremely rich ecosystems, with measures for its monitoring and protection. This was the basis for a 1991 plan for a zoned biosphere reserve including three core areas, a buffer zone and a transition zone covering over 145,000 ha of the Guinean upper Cavally river basin. Guinea at that time admitted an error in the definition of the boundary at the time of its World Heritage nomination and the area proposed for mining was not part of the reserve. In 1993 Guinea accepted the recommendation by an expert mission led by the World Heritage Centre of a corrected boundary which would ensure the site's integrity. Mining did not then prove economically feasible, but a reduction of about 1,550 ha in the World Heritage site area was accepted by the World Heritage Committee in December 1993, as per the expert mission's recommendation, to preserve the integrity of the rest of the property while allowing for future mining. In 2005, the Société des Mines de Fer de Guinée (SMFG), backed by the Euronimba consortium, restarted exploration for iron ore in the concession.

Following the Pilot Program of the 1990s, in 2000 UNDP secured funding from the GEF and internally to begin preparation of a long-term program for the protection of the site from the multiple actual and potential threats facing it. A program supported by GEF-UNDP-UNESCO-FFI *Conservation of the Biodiversity of the Nimba Mountains through Integrated and Participatory Management*, has been under implementation since 2005. This project intends to address environmental and legal issues, protection of the Biosphere Reserve's three core areas, legal definition of a buffer zone, monitoring the water quality and climate of the region, socio-economic studies and integrated rural development compatible with the conservation objectives of the core areas. It is complemented by NGO activities, in particular led by FFI, that pursue ecological monitoring and work with local village surveillance committees to persuade hunters to become part of the efforts to protect wildlife (UNESCO/IUCN, 2007). SMFG commits, during the time it extracts ore from the Nimba Concession, to enhance environmental protection of the WHS and Biosphere Reserve, and contribute to the economic growth of the region in a way respectful of the integrity of the Reserve.

In 2001 and 2002 tri-national meetings involving Guinea, Côte d'Ivoire and Liberia were sponsored by UNESCO, Rio Tinto and IUCN Netherlands and organised by Flora & Fauna International with support from Conservation International and BirdLife International to promote transboundary cooperation at all levels and agree a common management strategy. FFI has re-launched transboundary collaboration and dialogue as of 2010, in particular now that the political tensions and civil instability of the previous decade have largely passed.

MANAGEMENT CONSTRAINTS

Mining apart, the principal threats to the World Heritage site are currently poaching, deforestation, encroachment by grazing cattle, bush fires, inadequate management, funding and staff, and lack of transboundary cooperation. The Liberian and Ivorian civil wars led to short-term refugee influxes, the effects of which are no longer visible. However they halted all management activity, already minimal,

as well as tri-national negotiations and NGO activity (UNESCO, 2003). Habitat destruction is a major threat, principally through slash and burn farming and the ensuing fires set by farmers to clear farmland for pasture, also by logging to clear more land. In the dry season hundreds of grazing cattle invade the Guinean part of the World Heritage Site.

Another potential threat is from the large-scale mining of iron ore. Mining from the 1963-1992 did enormous damage to the Liberian part of the range until civil war caused activity to cease. The present World Heritage site excludes both the Liberian part of the mountain, disturbed by past iron mining and intensively poached to the present, and the Mining Enclave in the northern end in Guinea. Starting in 1969, at the north end of the mountains, roads, drill pads and adits were built and workshops and a camp established in the 1944 Strict Nature Reserve. Current plans propose to mine deposits found in the northern part of the ridgeline, potentially lowering the ridge by 300m over a distance of two kilometres. 1000-2000 ha of the range would be affected and some 800 ha of the range would be fully transformed by the proposed mine, estimated to produce 600 million tonnes of iron ore with an annual production of 30 million tonnes of ore and 80 million tonnes of waste. Early exploration works disturbed hundreds of square metres of soil, causing significant erosion and stream pollution noted in the May 1993 UNESCO/IUCN mission report. Current exploration activities involve significant efforts to avoid these problems (UNESCO/IUCN, 2007) CEGENS's institutional structure, management, staff and resources are not adequate to cope with the monitoring and patrolling needed for effective surveillance in Guinea and to ascertain the status of the wildlife (IUCN, 2008). The disturbances of the past decade have also limited the effectiveness of transboundary cooperation.

The *Société des Mines de Fer de Guinée* (SMFG) is leading current exploration activity and is backed by the Euronimba consortium composed of BHP Billiton, Newmont LaSource and Areva-Cogema. To reduce environmental impacts, SMFG is implementing measures to control water pollution and minimise the impacts of local communities within the Reserve. As part of the future environmental impact assessment, the best way to rehabilitate the mined zones will be studied. If hunting were strictly controlled, the area could serve as a buffer zone for the World Heritage site (Lamotte, 1983). If not properly managed, the disturbance could reduce numbers of key species and initiate invasion of the Reserve by exotic species. In 2003, SMFG was established to restart exploration for iron ore within the concession, claiming that they were at least ten years away from shipping ore from the mine, which would then be worked for 30 years (IUCN, 2003). Pre-existing exploration roads were re-opened in 2005. The company has prepared detailed terms of reference for a top-class environmental and social impact assessment for the proposed mining project, including an in-depth baseline study of fauna and flora in and surrounding the mining concession before a decision to develop the project is taken. In February 2008 and April 2009, SMFG convened consultations with the World Heritage Centre, IUCN, UNESCO's Division of Ecological and Earth Sciences, UNDP, UNEP, *Guinée Ecologie* and the Guinean Government to present the proposed mining project, discuss concerns and review the draft terms of reference for the impact assessment, for the mining project itself (construction, extraction and closure phases). SMFG has in the mean time prepared a detailed environmental management plan to guide its exploration activities which has been shared with and commended by CEGENS and other Ministry of Environment structures.

In Côte d'Ivoire, following the civil strife of 2002, the reserve in Côte d'Ivoire passed out of government control into rebel hands, its infrastructure and equipment was pillaged and conservation ceased though the natural resources there were reported to have survived (UNESCO, 2006). However in late 2007 a preliminary agreement to exploit the iron ore of the sector was reached between the Tata Steel Production Company and the *Société d'État pour le Développement Minier de la Côte d'Ivoire*. When this was discovered, the World Heritage Committee and IUCN made clear the illegality of the proposed concession and Tata withdrew, promising "not to carry out mining that would damage the outstanding universal value" of the Ivorian SNR. However, the State has not confirmed revocation of mining concessions in the property (UNESCO, 2010). The *Office Ivoirien des Parcs et Reserves* has re-established control although the sector is still difficult to enter, but poaching seems to have decreased as a result of a system of village ecologists set up by a team from the University of Tokyo who coordinate the results of their monitoring (IUCN, 2008).

STAFF

In 2005, in the Guinean portion of the WHS, apart from the Director there were 25 permanent staff in CEGENS although most were based in Conakry 1,000 km away. With support from FFI, they were moved to nearby Lola from Conakry. However many of them returned independently to Conakry and few report to work at Nimba, citing the lack of operating resources makes it impossible for them to do their jobs properly. The number of park guards was increased by the UNDP Biodiversity Conservation Programme but they are not regularly paid or equipped, nor are they formally integrated into CEGENS with full powers, nor are they motivated and actively pursuing their responsibilities.

BUDGET

Funding is almost entirely from international projects. Between 1982 and 1997 the World Heritage Fund gave nearly US\$350,000 for conservation projects and equipment. In 2000 preparations began for a UNDP/GEF Project in which the GEF granted US\$3.65m, UNDP \$1.65m and FFI \$200,000 towards a nine-year program of integrated conservation and development to preserve and maintain the site. The program began in 2005 but as of 2010, it was not judged to be effectively implemented. In 2001 WHF gave US\$30,000 towards the preparations of the UNDP/GEF grant (UNESCO, 2002). In 2001-2 FFI organised two tri-national meetings and reports, funded by WHC, Rio Tinto Mining Plc. and the Netherlands Committee for IUCN. In 2003, WHF gave US\$30,000 and FFI, US\$10,000 to CEGEN to mitigate impacts from refugee invasions in Guinea generally and in the Deré forest. In 2004 SMFG provided FFI with \$25,000 to launch restoration efforts of the Deré Forest. In 2008 IUCN noted that US\$473,349 had been provided from international sources for Ivorian Nimba (IUCN, 2008). Once a mine is operational, SMFG will contribute at least \$500,000 per year towards conservation and integrated development of the area (J. Suter, *in litt.*, 2010).

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