World Heritage Sites

Protected Areas and World Heritage

# MANAS WILDLIFE SANCTUARY
# ASSAM, INDIA

*Manas Wildlife Sanctuary on the borders of the Indo-Gangetic and Indo-Malayan biogeographical realms is the most diverse of India's wildlife reserves. It lies on a gentle alluvial slope in the foothills of the Himalayas, where wooded hills give way to grasslands and tropical forest. It is home to a great variety of wildlife, including many endangered species such as the tiger, the pygmy hog, and the Indian rhinoceros and elephant.*

*Threats to the Site: This site was listed in Danger between 1992 and 2011, after invasion by militants of the Bodo tribe seeking political redress. Its infrastructure suffered great damage from 1988 to 1993 and political instability between 1990 and 1996 destroyed hundreds of trees and animals, including nearly all the Park's rhinoceros and 50% of its tigers. The damage was estimated at more than US$2 million.*

*Listing by the World Heritage Committee influenced the governments of India and the state of Assam to draw up, with the Park authorities, a $US2.35 million rehabilitation plan in 1997. Security and relations with local villagers improved but the threat of destruction remained until 2003 when the insurgents surrendered and began to cooperate through the newly formed Bodoland Territorial Council. The Park has since begun to recover and rebuild its infrastructure.*

## COUNTRY
India - Assam

## NAME
Manas Wildlife Sanctuary

## NATURAL WORLD HERITAGE SITE
1985: Inscribed on the World Heritage List under Natural Criteria vii, ix and x.

1992-2011: Listed as a World Heritage site in Danger because of damage and losses caused by civil unrest.

## IUCN MANAGEMENT CATEGORY
IV Habitat & Species Management Area

## BIOGEOGRAPHICAL PROVINCE
Burma Monsoon Forest (4.09.01)

## GEOGRAPHICAL LOCATION
The Park lies on the border with Bhutan, 41 km north of Barpeta Road township and 175 km northwest of Guwahati, the regional capital. It spans the Manas River and is bounded on the north by the Royal Manas Wildlife Sanctuary in Bhutan, on the south by the populous region of North Kamrup and on both east and west by forest reserves: 26° 30' to 27° 00'N by 90° 50' to 92° 00'E.

## DATES AND HISTORY OF ESTABLISHMENT
1907: Part of the area which was previously preserved as royal hunting grounds was classified as North Kamrup Forest Reserve; more land was added in 1927;

1928: Manas (previously North Kamrup) declared a Sanctuary for rhinoceros (36,000 ha);

1955: Reserve enlarged to 39,100 ha;

1971: The government set up an 890 ha seed farm in the Sanctuary to counter local encroachment pressures;

1973: Manas Reserve established as the core of the 283,712 ha Manas Tiger Reserve: Project Tiger set up to preserve the Indian tiger population;

1988: The contiguous Royal Manas National Park in Bhutan established;

1989: Declared a core zone of the newly formed national Manas Biosphere Reserve (283,700 ha);

1990: The Sanctuary was upgraded to a National Park and enlarged to 52,000 ha by the inclusion of the former Panbari, Koklabari and Kahitama Forest Reserves (Oliver, 1993);

1992+: Listed as endangered because of habitat destruction and heavy wildlife loss caused by Bodo insurgent groups protesting in-migration from other states and loss of their access to forest resources;

2001: The Park declared the core zone of the Buxa-Manas Elephant Reserve (283,700 ha);

2003: The Bodoland Territorial Council (BTC) recognised, allowing the Bodo people some autonomy. The Park included within the Chirang Ripu Elephant Reserve.

2011: Site removed from Endangered status.

## LAND TENURE
State, in the districts of Barpeta and Kokrajhar. Administered by the Assam State Forest Department.

## AREA
50,000 ha It is contiguous with Royal Manas Wildlife Sanctuary in Bhutan (102,300 ha).

## ALTITUDE
Ranges from 61m to 110m (WPSI, 2002).

## PHYSICAL FEATURES
The Park, which is of great physical beauty, lies on a wide low-lying alluvial terrace below the foothills of the outer Himalaya. The Manas River flows through the west of the Park, where it splits into two separate rivers, the Beki and Bholkaduba, to join the River Brahmaputra some 64 km further south. These and five small rivers running through the Reserve carry enormous amounts of silt and rock from the foothills as a result of heavy rainfall, steep gradients and friable bedrock upstream. Over the limestone and sandstone bedrock, boulders and gravels of the Bhabar savanna area to the north, flood waters have formed shifting channels and swamps and a soil of porous alluvial river terraces of coarse detritus under layers of sandy loam and humus where the water table is very low. The Terai grasslands in the south consist of deep deposits of fine alluvium with underlying pans where the water table lies very near the surface, making it potentially useful farmland. The Manas basin in the west of the Park is frequently flooded during the monsoon but never for very long due to the sloping relief. Drowning of wildlife is negligible as animals are able to take refuge on islands of high ground (Deb Roy, 1991).

## CLIMATE
The climate is warm and humid with up to 76% relative humidity. It rains from mid-March to October with most rain falling during the monsoon months from mid-May to September, flooding the western half of the Reserve. The mean annual rainfall is 3,330mm. November to February is relatively dry when the smaller rivers dry up and large rivers dwindle (Deb Roy,1991). The mean maximum summer temperature is 37°C and the mean minimum winter temperature is 5°C (WPSI, 2002).

## VEGETATION
Manas lies on the border between the Indo-Gangetic and Indo-Malayan biogeographical realms which gives it great natural diversity. There are three main types of vegetation: sub-Himalayan alluvial semi-evergreen forest, east Himalayan mixed moist and dry deciduous forests, the commoner type, and grasslands. Much of the riverine dry deciduous forest is an early successional stage, being constantly

renewed by floods. Away from water courses it is replaced by moist deciduous forest, which is succeeded by semi-evergreen climax forest in the northern part of the Park. Its common trees include *Aphanamixis polystachya*, *Anthocephalus chinensis*, *Syzygium cumini*, *S. formosum*, *S. oblatum*, *Bauhinia purpurea*, *Mallotus philippensis*, *Cinnamomum tamala*, *Actinodaphne obvat*a; Tropical moist and dry deciduous forests are characterised by *Bombax ceiba*, *Sterculia villosa*, *Dillenia indica*, *D. pentagyna, Careya arborea*, *Lagerstroemia parviflora*, *L.speciosa, Terminalia bellirica*, *T. chebula, Trewia polycarpa*, *Gmelina arborea*, *Oroxylum indicum* and *Bridelia* spp. Much of the most valuable timber has been harvested.

Two types of alluvial grasslands cover almost 45% of the Park: low alluvial savanna woodland and semi-evergreen alluvial grassland. These are created and maintained by burning, and on a smaller scale, by elephants. The riparian grasslands are the best tiger habitat in India, and also well suited to the unique wild buffalo herds, gaur and barasingha, elephants and waterbirds. There are 43 different grass species, *Imperata cylindrica, Saccharum naranga, Phragmites karka* and *Arundo donax* predominating (Menon, 1995). There is also a variety of tree and shrub species such as *Dillenia pentagyna* which dominates the swamp forest, silk cotton *Bombax ceiba* a dominant *of* the savanna woodland, and *Phyllanthus emblica*, and shrub species of *Clerodendrum*, *Leea*, *Grewia*, *Premna*, *Mussaenda, Sonchus, Osbekia* and *Blumera*. There is a wide variety of aquatic flora along river banks and in the numerous pools (Jain & Sastry,1983). Some 374 species of dicotyledons, including 89 trees, 139 species of monocotyledons including 43 species of grass, and 15 species of orchid have been identified (Project Tiger,2001). Invasion by *Mikena cordata* vines and *Eupatorium odorata* is a problem.

## FAUNA

The Park contains the country's highest numbers of endangered and endemic species: 22 of India's Schedule I mammals and at least 33 of its animals listed as nationally threatened (* below), by far the greatest number of any protected area in the country. 55 mammals, 50 reptiles and three amphibians have been recorded, several species being endemic (Project Tiger, 2001). Many are typical of south-east Asian rain forest and have their westernmost distribution here, while other species are at the easternmost point of their range. It had the country's largest concentration of elephants, the second largest population of tigers and the third largest population of rhinoceros before the tribal incursions when the populations of all the protected species which had been gradually increasing, fell back (Deb Roy,1992).

The most notable threatened species were the indicator species the *tiger *Panthera tigris* (EN), numbering 70 in 2000, down from 123 in 1984, *Indian elephant *Elephas maximus* (EN): 658 animals in 2005 in the greater Chirang Ripu Elephant Reserve, of which Manas Wildlife Sanctuary is the main elephant habitat, compared to 567 animals in 2002 for Manas Wildlife Sanctuary alone (UNESCO, 2006) and *Indian rhinoceros *Rhinoceros unicornis* (VU), 80 in 1990, 39 in 1997 (Project Tiger, 2001) and perhaps 6 in 2006 (UNESCO,2006). Other mammals include Indian giant squirrel *Ratufa indica*, *particolored flying squirrel *Hylopetes alboniger*, *Indian pangolin *Manis crassicaudata,* *hispid hare *Caprolagus hispidus* (EN), *golden leaf monkey *Trachypithecus geei* (EN), rare, recently discovered and endemic to Manas and to adjoining Bhutan which numbered only 305 in 1980, *capped langur *T. pileatus* (VU), *western hoolock gibbon *Hoolock hoolock* (EN), Asiatic wild dog *Cuon alpinus* (EN), *sloth bear *Melursus ursinu*s (VU), Himalayan black bear *Ursus thibetanus* (VU), *greater slow loris *Nycticebus coucang* (VU), *binturong (bearcat) *Arctictis binturong* (VU), *clouded leopard *Neofelis nebulosa* (VU), *leopard *P. pardus*, *Asiatic golden cat *Pardofelis temminckii*, *marbled cat *P. marmorata* (VU), *fishing cat *Prionailurus viverrinus* (EN) *leopard cat *P. bengalensis*,), *South Asian river dolphin *Platanista gangetica* (EN), *pygmy hog *Porcula salvanius* (CR), rediscovered in 1964 in Manas, *swamp deer or barasingha *Rucervus duvaucelii* (VU), with approximately 450 individuals (Roy,1992), sambar or spotted deer *Rusa unicolor* (VU), hog deer *Axis porcinus* (EN), chital or Indian spotted deer *A. axis*, northern barking deer *Muntiacus vaginalis,* *gaur or Indian bison *Bos gaurus* (VU) and Indian water buffalo *Bubalus arnee* (EN), probably the only pure strain of this species in India.

The Park lies within one of the world's Endemic Bird Areas (Stattersfield *et al*.,1998). Including migrants, over 450 species of birds have been recorded and about 350 breed in the area, 16 being endemic (Deb Roy,1991) including the threatened *Bengal florican *Houbaropsis bengalensis* (CR), a type of bustard, *great hornbill *Buceros bicornis* and *wreathed hornbill *Aceros undulatus* among other hornbill species. The *Bengal floricans of the National Park were estimated at 80 birds with 24 male territories in the Park in 1988, a fifth of the world population (Narayan *et al*.,1989). Pied harrier *Circus melanoleucos* nested in 1988-9, the first confirmed record for India (Narayan *et al*.,1989). Recent records of threatened species include white-rumped and slender-billed vultures *Gyps bengalensis* (CR)

and *Gyps tenuirostris* (CR), greater spotted eagle *Aquila clanga* (VU), lesser kestrel *Falco naumanni* (VU), rufous-necked hornbill *Aceros nipalensis* (VU), white-throated bushchat *Saxicola insignis* (VU), marsh, Jerdon's and slender-billed babblers *Pellorneum palustre* (VU), *Chrysomma altirostre* (VU), and *Turdoides longirostris* (VU), blackbreasted parrotbill *Paradoxornis flavirostris* (VU), grey-crowned prinia *Prinia cinereocapilla* (VU), bristled grassbird *Chaetornis striatus* (VU), and yellow weaver *Ploceus megarhynchus* (VU). Uncommon waterfowl species include *spotbilled pelican *Pelecanus philippinensis*, *greater adjutant stork *Leptoptilos dubius* (EN), *lesser adjutant stork *L. javanicus* (VU), Baer's pochard *Aythya baeri* (EN) and swamp francolin *Francolinus gularis* (VU) (Scott, 1989; BirdLife International, 2004).

50 reptile species include the *gharial *Gavialis gangeticus* (CR), possibly introduced from Bhutan in the Kosi River or from a captive breeding program, eleven species of snake including vine snake *Ahaetulla nasutas*, banded flying snake *Chrysopelea pelias* Assam trinket snake *Elaphe frenata,* king cobra *Ophiophagus hannah* (VU), *Indian rock python *Python molurus,* and banded krait *Bungarus fasciatus;* also *yellow and *common monitor lizards *Varanus flavescens* and *V. salvator,* and two rare turtles: *Assam roofed turtle *Pangshura sylhetensis* (EN), lost until 1988, and Indian black turtle *Melanochelys trijuga* (Rahmani *et al.*,1989).

## CULTURAL HERITAGE

Manas takes its name from the Goddess Manasa. The forests of the Reserve were traditionally inhabited and their resources used mainly by Bodo and Adhivasi tribesmen, though the area was also preserved as royal hunting grounds for two royal families. There are no archaeological remains (Project Tiger, 2001).

## LOCAL HUMAN POPULATION

Some 57 villages with 28,800 inhabitants live on the fringe of the National Park, predominantly Bodo tribal people (Project Tiger, 2001). They come under the control of he District Revenue Authorities. Surrounding forests, originally tribal lands used for grazing and tree products, come under the Assam Forest Department and have been logged by the timber and paper industries for a pittance, after which, immigrant farmers illegally purchased the cleared land. This denial of access so alienated the tribal people that they preferred to see the jungle razed than let outsiders take it. Their growing numbers forced villagers into using the protected forests which caused continued conflict with the National Park. Driven by feelings of deprivation and neglect, insurgent groups became the greatest threat to the Park and a destructive insurgency raged from 1988 to 2003. That year the Bodo laid down their arms, the Bodoland Territorial Council, was formed and was accorded a measure of autonomy. The locals began to rebuild the Park as their own and even to fund it when the State did not (Debonnet & Lethier, 2008).

## VISITORS AND VISITOR FACILITIES

Some 5,000 local sightseers used to visit the Sanctuary during the winter holidays. They disturbed the wildlife and may have to be accommodated nearer the edge of the Park (Deb Roy,1991). In 1984 32,860 visited the site, but owing to the Bodo agitation in Assam, the Park was closed between 1989 and 1995. In 1996 there were some 2,770 visitors (Project Tiger, 2001). Danger from the insurgents then became so great that the Park was again closed. By 2001, foreign visitors still needed a permit to enter the Park and did so at their own risk, despite which, in 2002 3,219 visitors visited, although no foreigners (UNESCO, 2003). In 2003 when tourism began to revive there were 90 foreign visitors. A forest bungalow at Mothanguri, in the north of the Park, has dormitory accommodation for 48 persons. A number of rest houses and camp sites were also available. The Tourist Department of Assam conducted deep safari tours, especially in the Mothanguri-Bansbari area, including elephant rides and boat trips down the river. The high potential for eco-tourism is being realised and local people and groups are becoming involved in this, building unauthorised roads and structures.

## SCIENTIFIC RESEARCH AND FACILITIES

The vegetation has been surveyed by the Botanical Survey of India (Jain & Hajra, 1975). Tiger and elephant censuses are regularly undertaken by Project Tiger. The status of the Bengal florican was investigated in May 1984 (Ali *et al.*, 1985). In 1993, WWF initiated a project to identify the essential needs of the fringe villagers to provide alternatives to their dependence on the Park (WWF, 1993). There is regular monitoring of the loss by area of timber, resources and species, conducted by the University of Guwahati, the Assam Remote Sensing Applications Centre, the Wildlife Institute of Dehra Dun and NGOs. Since 2003 two rough surveys of the major wildlife populations were made (Mathur *et al.,*2007) and in 2010 several NGOs (Ashoka Trust for Research in Ecology and Environment, Aaranyak, WWF-INDIA and others) had begun re-surveying the fauna (UNESCO,2010)

## CONSERVATION VALUE

Lying at the confluence of the Indo-Gangetic and Indo-Malayan biogeographical realms Manas has great natural diversity as well as spectacular scenery. Its varied habitats support 22 scheduled species, and it is the richest in species of all Indian wildlife areas. It is the core of an extensive tiger reserve that protects an important migratory corridor for elephants and other wildlife along the West Bengal - Arunachal Pradesh - Bhutan borders. Its wetlands are of international importance. It is also the single most important site for the survival of golden langur, pygmy hog and hispid hotspot and is one of the world's Endemic Bird Areas.

## CONSERVATION MANAGEMENT

The Assam Forest Department is responsible for the administration of the National Park under the Wildlife Protection Act of 1972. Its management was a low priority until the 1960s, but its inaccessibility protected it except for marginal encroachments and livestock grazing by villagers which were eliminated during that decade, at the cost of the lasting resentment of the local people. The Park is essentially a wilderness, forming the core of the Tiger Reserve which is classified as reserve forest. The last legal forestry in the core area occurred in 1964. Hunting officially ceased when the area was established as a Sanctuary, but before the Bodo invasion, traditional hunting did not have noticeable effects on the wildlife. Much roadstone was extracted from the area during the construction of the National Highway in 1963-1964 but no further exploitation of any kind is now allowed. Plantations were created along the southern border as a buffer against agricultural encroachment but this stopped in 1977. The restrictions do not apply to the surrounding buffer zone of the Tiger Reserve, which is managed on a multiple-use basis. There, residents are allowed to selectively remove timber, collect firewood, cultivate land, graze their domestic livestock and benefit from inoculation of their cattle to prevent transmittal of diseases to the wildlife (Deb Roy,1992).

More intensive management was begun in the 1960s. Careful controlled burning in autumn is the most important management tool to maintain the different habitats, especially the grassland. It is both a traditional practice and done to prevent devastation by intense wildfires (Deb Roy,1991). Management has always been oriented towards the larger mammals, especially the tiger. The Project Tiger scheme has provided staff accommodation, marked boundaries, developed roads and a wireless network to improve anti-poaching operations. A rhinoceros action plan was prepared under the Biodiversity Alliance co-ordinated by the M. S. Swaminathan Research Foundation and WWF-India (WWF,1996). Following successful captive breeding of gharial, there were also plans to restock channels in the area. A management plan to include social welfare measures such as the provision of water, medical and veterinary care and farming advice was drawn up (WWF/IUCN, 1990). A three year rehabilitation program was prepared by the Ministry for Environment and Forests, the State Forest Department of Assam and the Manas Directorate which aimed to restore the infrastructure, and set up habitat improvement programs and eco-development schemes for surrounding villages (Project Tiger, 2001; UNESCO,1997). However, from 1988 to 2003 the Park was occupied by Bodo separatist groups protesting major in-migration from other states which made them a minority in their own homeland and campaigning for restoration of their right to use forest lands and for tribal autonomy. This resulted in widespread destruction, the withdrawal of staff and a major loss of larger animals. However, the conflict had little physical impact on the conservation value of the site except at its southwestern end (Deb Roy,1992).

By 2002 however, staff were slowly reoccupying guard posts and re-establishing control. By mid 2002, a management plan was finalised (in need of revision by 2008) which set out an agenda for management-oriented research, a community outreach strategy, conservation and awareness programs, tourist activities and improvements in infrastructure (IUCN, 2002). Relations with local villagers improved. Volunteer groups from the local NGOs Green Manas and *Manas Bandhu* slowly began to persuade local militants to help conserve not destroy the Park (PA Update, 2001). Camps and guard posts were rebuilt, allowing better management. The government included the reserve in Project Elephant and was facilitating committees on participatory planning and economic development projects (UNESCO,2002). Relations with Bhutan were very good despite the scale of poaching and insurgency. A WHC/IUCN mission visiting the site in early 2002 promoted the nomination of Bhutan's Royal Manas Wildlife Sanctuary as a future transboundary World Heritage site which would improve protection over the whole Manas ecosystem. This was revived by the 2008 WHC/IUCN Mission with renewed interest from Bhutan, Assam's Chief Wildlife warden, the Indian and Bhutan offices of WWF and the UNESCO office in New Delhi, and the Indian government itself Debonnet & Lethier, 2008).

In 2003, when their insurgent bases in Bhutan just across the border became usable, the Bodo insurgents agreed a pact with the government, handed in their arms and were granted a degree of autonomy in the Bodoland Territorial Council (BTC). Thereafter, considering the Park their own territory, they were persuaded to protect it against intruders and to convince neighboring villagers to take the same attitude. The Park was understaffed and underfunded, with inadequate equipment and infrastructure no comprehensive conservation and interpretive strategy towards local communities. But as a result of the tribes' cooperation, poaching declined, tourism gradually restarted and it began to be possible to rebuild the Park's infrastructure (UNESCO, 2006). By 2005, it was possible to initiate ecotourism and the local people were becoming involved in rebuilding the Park's infrastructure (UNESCO,2005). In 2006 the State Government released funding. New Park roads, bridges, buildings and a wireless system were built and five field stations had been manned and armed. It also initiated the Indian Rhino Vision (IRV) 2020 in collaboration with the International Rhino Foundation, WWF-India, the US Fish & Wildlife Service and others. This aims at a major population and range expansion program for rhinos in Assam, relocating the animals especially to Manas. Reintroduction started in 2006 with one female from Kaziranga National Park (UNESCO, 2006). That year, local Bodo communities and the Territorial Council endorsed IRV 2020 and committed their full support. Funds were released to WWF-India to improve the infrastructure in Manas for this purpose. By 2008 three international foundations, four national and six local NGOs were providing support to the property. The 2008 WHC/IUCN mission was very impressed by the devotion of the local people to the rehabilitation of the Park and their belief in the alternative livelihoods it could provide, in particular its potential for tourism. By 2008 31 Park camps had been rebuilt and 7 more for the rhino reintroduction program were due for completion, 130 km of trails and 100 km of trails plus bridges had also been reopened. Former poachers were even collaborating with the revival. It remained urgently necessary to conduct a baseline survey on the recovery of wildlife populations and set up a full monitoring system for flagship species. It was also essential to resolve the problem of releasing funds held back by the state (Debonnet & Lethier, 2008). By 2008 funds were at last were available for improvement of park management, building staff capacity, increasing local awareness, involvement and sustainable development (UNESCO,2010)

## MANAGEMENT CONSTRAINTS

The Indian National Forest Policy Act of 1952 held the poor responsible for deforestation and stated that national forests should be used to produce timber for industry and commerce, not for subsistence by the local people, on the ground that where land is owned rather than held in common, it is usually treated with care (Lurie 1991). The area was therefore made a Sanctuary without provision of alternative resources for the local people who continually encroached on it as though it was still open to them. The Tiger Reserve as a whole remains intact, although the buffer zone has suffered many encroachments, especially between Sankosh in the far west and the Manas river, which have led to haphazard fragmentation of the forest. About 1,500 ha in the Panbari Reserve Forests (the western core zone of the Park) have been illegally settled since 1973. There is no buffer to the south, and village communities on the edge collect grasses, fuel, wood, fodder, timber and graze their livestock in the Park. Villagers believe that these uses are theirs by right, which have been denied to them since the designation of the Tiger Reserve in 1973 (WWF,1993).

Uncontrolled dry season burning and unsustainable levels of hunting, organised poaching and illegal extraction of timber and firewood and encroachments occur in the buffer zone, and the tigers are persecuted. Against this must be set the frequent damage to the villagers' animals, crops and houses by tigers, elephants, wild boar and deer from the Park. During 1979-83 for example, there were 11 deaths by a man-eating tiger for which no compensation was paid. Crop-raids by elephant and hog-deer are increasingly common, which leads to continued ill-feeling amongst local people (Deb Roy,1991). In 1984 the government tried to close Kokla Bari Seed Farm, set up in the core Park grasslands in 1971, but was strongly opposed by plains tribes, such as the Borokacharis, who are employed there (Choudhury, 1986). In the 1990s two dams were proposed in the upper reaches of the Manas and Sankosh rivers which might severely impact the integrity of the Manas ecosystem. Serious flooding in 2003 which washed away part of the Park's riverside land and equipment was attributed to works on the Manas river dam upstream in Bhutan (WildLife Trust of India, 2004).

Between 1988 and 2003, various factions of the Bodo people, who form about one-third of Assam's population, intermittently invaded the park. In February 1988 both Reserve and Park were violently occupied by separatist members of the local All Bodo Students Union (ABSU), campaigning for autonomy for its people and for restoration of their right to use forest lands (Jackson,1989). They were later joined by Bodo Liberation Tigers (BLT), the United Liberation Front of Asom (ULFA) and the National Democratic Front of Bodoland (NDFB). Arson, looting, destruction of bridges and buildings and

the murder of eight wildlife guards by the terrorists occurred, in the absence of the police. The park was closed to the public between 1989 and 1996. This resulted in the forced evacuation of Sanctuary staff, leaving the Park open to professional poachers, timber smugglers and fringe villagers. 21 of the 44 ranger posts were destroyed and 30 were abandoned. As a result, hundreds of animals, especially rhinoceros, but including elephant, tiger and valuable prey species of deer were killed (Hussain,1989; Rahmani *et al.*,1989). Consequently, in 1992, the site was placed on the list of World Heritage in Danger. The Park was closed to the public between 1989 and 1996 and the disturbances lasted intermittently from 1988 to 2003, recurring in 2001 and 2002 as militants of the ULFA and NDFB fled from refuges in Bhutan and (PA Update, 2001; UNESCO, 2002).

The insurgents had little impact on the conservation value of the site which was protected by its inaccessibility, dense cover and poor visibility, except at its southwestern end (Deb Roy,1992). However, damage totalling over US$2 million to the infrastructure, the murder over ten years of 15 guards and the destruction of guard posts in twelve areas of the Park, prevented the reestablishment of normal protection and undermined management and staff morale. The infrastructure long remained poor and landmines were set along the Bhutan border by the insurgents. The Assam Forest Protection Force was available to keep order, but until a pact in 2003, militants still crossed the area, especially in the Eastern and Western ranges (Milne,1997; Project Tiger, 2001), and only the central Bansbari Range section of the Park was considered safe to patrol (IUCN,2002). However, a ten-year Master Plan under the auspices of the Project Tiger Directorate of the Ministry of the Environment was drawn up (Gupta, 2005).

Poaching, always a problem, was most serious during the 1990s. The surrounding villagers, being very poor, depend on natural resources for their livelihood which they perceive the Park and Reserve to be denying them. They were therefore hostile. But the most serious poaching was carried out by large well-financed well-armed professional gangs, partly backed by traders in endangered species (Narayan, 1990). As a result, hundreds of animals including rhinoceros, elephant, tiger and valuable prey species of deer were killed (Hussain,1989; Rahmani *et al.*,1989). There is a rich market for horns so the local rhinoceros population was nearly extinguished by poachers: numbers dropped from approximately 80 in 1990 (Roy,1991) to only 6 in 2002 (IUCN, 2002). Partly to feed the market in tiger parts the tiger population fell from 123 in 1984 to 70 in 2000. 20 elephants had been killed by 1997 and deer are still frequently taken for village feasts (Project Tiger, 2001). Hundreds of trees were felled and encroachment was continuous, especially in the Panbari Forest, where the habitats of endangered species such as golden langur, hispid hare and pygmy hog, were put at risk. Illegal grass-cutting for fodder and grazing also occurred. Despite the high level of crime, protection of the Park by the state and central governments was delayed by lack of available trained and experienced manpower, and by the political difficulty of releasing funds granted for this use. To improve relations with villagers, funding intended for Park use was instead spent on schemes to benefit them, and on infrastructure, leaving the Park dependent on other sources of funding (UNESCO 2000).

## STAFF

Administration of the Tiger Reserve is the responsibility of the field director of Project Tiger, under the Forest Department. In 1986 there were 4 forest rangers, 2 deputy rangers, 29 foresters, 12 head game watchers, some 49 forest guards, 46 game watchers and 104 other staff. In 2000, 158 of 469 staff posts (294 being forest guard posts) were unfilled and the staff's equipment, experience and budget remained inadequate (Project Tiger, 2001; IUCN, 2001). UNESCO did provide 3 vehicles and boats.

In 2008, there was a permanent staff of 252 with 70 full time casual staff as well as 50 young volunteers recruited under the Indian Rhino Vision Program. The BTC funded 90 full-time armed and uniformed volunteers. 50 guards and 11 rangers from the Forest Protection Force also assisted. However, 123 of the 445 established positions remained vacant through lack of funding, some of which could be filled by the most promising volunteers (Debonnet & Lethier, 2008).

## BUDGET

In 1989-1990 Rs 2,545,000 (US$195,770) were allocated by the Governments of India and Assam for biodiversity and rhino conservation, but much was said to have been used for other purposes. In 1995 less than two thirds of the annual budget of US$272,850 had been paid by 1996 and was inadequate. In 1997 the World Heritage Fund granted US$75,000 for vehicles, boats and equipment, and in 1998, US$90,000 for ranger posts and staff housing (UNESCO, 1988). Because of the insecurity of the site, this last was used instead on veterinary and health camps and repairs to irrigation systems to improve

relations with villagers (UNESCO,2000). In 1997-1998 the Indian government granted US$500,000 to strengthen conservation in the Reserve (UNESCO,1999).

In 2005-6 WHF provided US$165,000 for purchase of equipment, rehabilitation of infrastructure and community activities and US$50,000 was released to WWF-India to improve the infrastructure in Manas for the IRV program. In late 2005, the State Government via Project Tiger released a first installment of Rs.8 million (US$202,500) to the National Park out of a budget for the year of Rs.19.8 million approved for the Park (UNESCO,2006). Since then however, the State has not released the funds for the Park sanctioned by the central government. By 2008 Rs312,900 (~US$7,900) had been received from the Project Elephant budget, but Rs9,300,000 (~US$335,000) sanctioned for the Project Tiger budget year was still to be released. The Park has had to rely on funding from the Bodoland Territorial Council which provided Rs4,504,500 (US$114,000) from its own budget to rehabilitate the infrastructure such as anti-poaching camps, bamboo bridges and patrol tracks, to buy vehicles and feed and pay volunteers. However, by 2008 the Ashoka Trust for Research on Ecology and Environment on behalf of the UNESCO India Biodiversity Program, was channelling funds from the UN Foundation, Ford Foundation and Suri Sehgal Foundation. to improve the park's management, build staff capacity, increase local awareness and involvement and sustainable development

## LOCAL ADDRESS

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## REFERENCES

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