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Cover Photograph

A gaggle of Bar-headed Geese near Ajukha, Dibru-Saikhowa Inset pictures: Tiger from Kaziranga National Park (Top left), Malayan Giant Squirrel, Hollongapar Gibbon Sanctuary (Top right), A female Great Pied Hornbill (Bottom left), An Elongated Tortoise near Koila Moila, Chirang District (Bottom right).

Photographs of Title Page

(From Left) An Emerald Dove, Ultapani; Hel river; Clouded leopard; Little Egret

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Innerline Reserved Forest–a view from near Jamalpur, Cachar district. This forest extending from Cachar to Hailakandi district is the largest reserved forest in Assam. It is also an important bird area.

the list of reptiles, which in total may be over 200 species. The list of insects and other invertebrates could be an incomplete one as many more new species are likely to be present.

Threats to Biodiversity

Habitat destruction and poaching are the major factors threatening the survival of natural habitats and wildlife. Other problems are disease, insurgency, straying into habitations and cultivations and various developmental activities. Habitat destruction by humans has threatened the survival of the remaining natural habitats as well as the wildlife species living therein. Because of unplanned clearance, the natural habitats are fragmented, resulting in isolated or pocketed populations that do not have any future. The main reasons for forest destruction are logging,



A bamboo raft on the Dhaleswari river, Gharmura, Hailakandi district. Unplanned harvesting of bamboo for paper mills is also a conservation issue. expansion of agriculture, *jhum* or slash-and-burn shifting cultivation by the hill tribes, unplanned clearance for human settlement, encroachment of various kinds and developmental activities such as construction of roads and railways through forests, large dams in forest areas, large-scale and unplanned bamboo harvesting for large paper mills and mining. During the later part of the last century, more than 2,000 sq km of prime habitat have been cleared for tea plantations. With such massive loss of habitat and increasing human–animal conflict, it is difficult for wildlife to survive.

Poaching for international trade in body parts and meat, mostly for local consumption, are serious threats to wildlife.

Outbreak of various diseases such as foot-and-mouth, rinderpest and anthrax; insurgency (the extremists themselves do not usually harm wildlife, others take advantage of the situation for tree-felling and poaching), straying into human

Despite conservation success, the Indian One-horned Rhinoceros is still under constant threat from poachers with international links. These animals, mother and calf were electrocuted in Pabitora Sanctuary. The author, then Joint Secretary in Environment & Forest department (second from right) and M. C. Malakar, then CCF, Wildlife (second from left) with other officials inspecting the carcasses.



habitations, tea estates, etc., leads to the death of a few animals every year and also loss of human lives. However, it is the conflict between elephant and human which has taken the most serious turn in recent decades. With the decrease in forest cover due to the ever-increasing human population, the conflict is becoming more serious by the day. Raiding of crops by wild elephants is a familiar phenomenon all over the area. In fact, during the paddy season, most pachyderms descend to the plains and for a few weeks remain at the forest fringe. Depredation in human settlements is another major area of conflict. However, most such cases occur near small disturbed forest pockets, in encroachments upon prime elephant habitat and on movement routes and where lone bulls go for granaries and country liquor. Once an animal strays out of a forest, villagers mob it out of curiosity as well as to kill or chase it. Accidental and deliberate poisoning is also a danger to the wildlife.

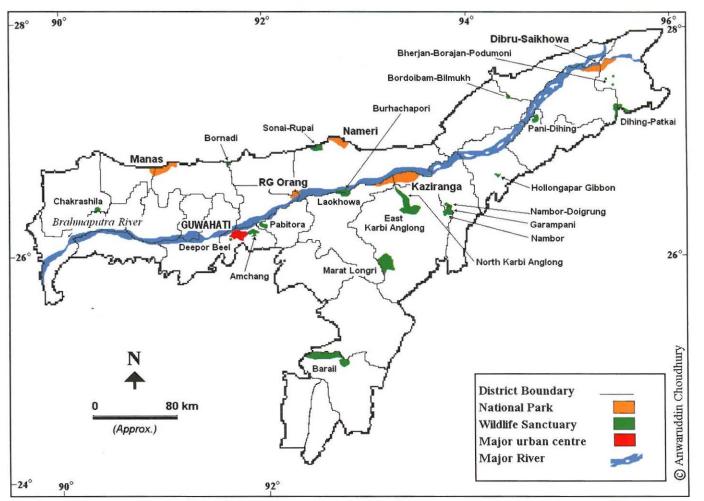


Fig.2. Map of Assam showing the Protected Areas.

KAZIRANGA











A Rhinoceros taking a wallow.With nearly two thousand animals, Kaziranga is the most important home of the Great Indian One-horned Rhinoceros.

KAZIRANGA

was approaching a make-shift bamboo bridge on the Diffolu River when a fullgrown Tiger surprised me. It was wallowing at the edge of the river in the world famous KAZIRANGA National Park of Assam when our presence disturbed it. In this part of India, with its thick elephant grass, sighting a Tiger is always rare, unlike in the open forests of Central and Western India where sightings are more frequent. Kaziranga (26°34'-46'N, 92°55'-93°36'E), which is also a World Natural



A pair of Black-necked Storks.

Heritage Site spreads over three districts – Golaghat, Nagaon and Sonitpur. Composed mainly of grassland with patches of light forests, a large number of *beels* or ox-bow lakes dot the park. The National Highway 37 cuts through the southern boundary of the park. Kaziranga was recognised by the British as an important rhino area as far back in 1902. In 1908, this area of wet savanna grassland was declared a reserved forest. In 1916 it was upgraded to a game sanctuary and in 1950 became a wildlife sanctuary. It was declared as the first national park of Assam in 1974 with a total area of about 850 square kilometers of a section of the Brahmaputra floodplains.

Grasslands form the largest vegetation zone in Kaziranga covering about half of the total area. The park is famous for having the largest concentration of the Great Indian One-horned Rhinoceros, now numbering nearly 2,000. The renowned naturalist, the late E.P.Gee, in *The Wild Life of India*, wrote that in 1908 there were

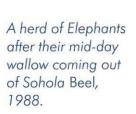


A typical Kaziranga landscape.

A 'heritage bungalow' in Kaziranga. This park has the best tourist accommodation in Assam.

only a few dozen rhinos left in Kaziranga. Thanks to the dedicated efforts of the authorities, the population increased significantly. In addition to the rhinos, the park has a variety of animals. The Asian Elephant, Tiger, Leopard and smaller wild cats, Wild Water Buffalo, a few Gaur, Hog Deer, Swamp Deer, Sambar, Muntjak, Wild Pig, Sloth Bear, Capped Langur, Hoolock Gibbon and a multitude of others. Kaziranga has the densest population of tigers as anywhere else in the country. It has around 58 per cent of the world population of endangered Wild Water Buffalo. The number of Wild Elephant is also more than a thousand, especially in winter.

The very rich avifauna of more than 500 species includes a large number of wintering waterfowls from such distant places like Siberia and Tibet. The Spot-billed Pelican breeds in the park while the Rosy Pelican is a winter visitor. While driving through the grass jungles one is likely to see Red Junglefowls and Swamp Francolins.





Such sights of large number of Hog Deer and Bar-headed Geese are familiar in Kaziranga.



Other notable species that one can spot in Kaziranga are Greylag and Barheaded Geese, Mallard, Spotbill and Ferruginous Ducks, White-necked and Black-necked Storks, 'critically endangered' Bengal Florican, 'near threatened' Great Pied Hornbill, Kaleej Pheasant, Pallas's and Greay-headed Fish Eagles and Osprey.

An important tourist draw, Kaziranga attracts a large number of people (more than one lakh or one-tenth of a million) from both India and abroad. The park has a number of facilities, hotels, resorts, rest houses, home stays and trained elephants for wildlife viewing available to visitors. During the monsoon, the park is closed to visitors as most roads become unfit for use and even the elephants find its access difficult inside the park.

Kaziranga's main problem is poaching and the Rhino is the main target. Rhino horn is highly sought after in China for supposed aphrodisiac value and in

Kaziranga has more than a thousand Wild Elephants.



Yemen for use as dagger handles (jambiyas). The traffic on NH 37, which runs through the southern boundary of the park is getting heavier. There are instances of rhinos, tigers, innumerable deer and small mammals, reptiles and even elephants being crushed to death by speeding vehicles. The haphazard mushrooming of *dhabas*, houses and shops along the highway should also be regulated.

To add to the problems already mentioned, the erosion by the Brahmaputra in the north is also a matter of grave concern. Then there were surprises, once in the name of railway in 1980s (averted after the railway authorities were convinced by me and Mrs Anne Wright) and then in the name of four-laning of the NH 37 (shelved for the time being).

Kaziranga has been declared as a Tiger Reserve under the 'Project Tiger' of the Government of India in 2007. I had the opportunity to work on that and issue the notification. My suggestion was that Laokhowa and Burhachapori Wildlife Sanctuaries, which are located a little downstream of Kaziranga should also be included in the Tiger Reserve. It found acceptance with the government and I was too happy to include it in the notification. The dedication shown by the field officials and their staff in defending Kaziranga, a World Heritage Site, often with acute resource crunch, is of the highest order. The support from different NGOs has greatly helped in boosting up the morale of the field staff. Over the years poaching has come down to a great extent. From 49 in 1992, the number of poached rhinos have come down to 40 in 1993, 14 in 1994, 25 in 1995 and only one in 2003 although there was a short period of concern in 2008 with ten-plus cases of poaching. This is undoubtedly an exception, in a sea of disappointment and should serve as an inspiration for all other protected areas across India.

With hundreds of villagers earning their livelihood from Kaziranga, from ecolodges to tour guides and safari vehicles, the realisation of direct benefit by locals is a reality in the area. And with that, there is the increasing local support for conservation of this unique World Heritage Site.

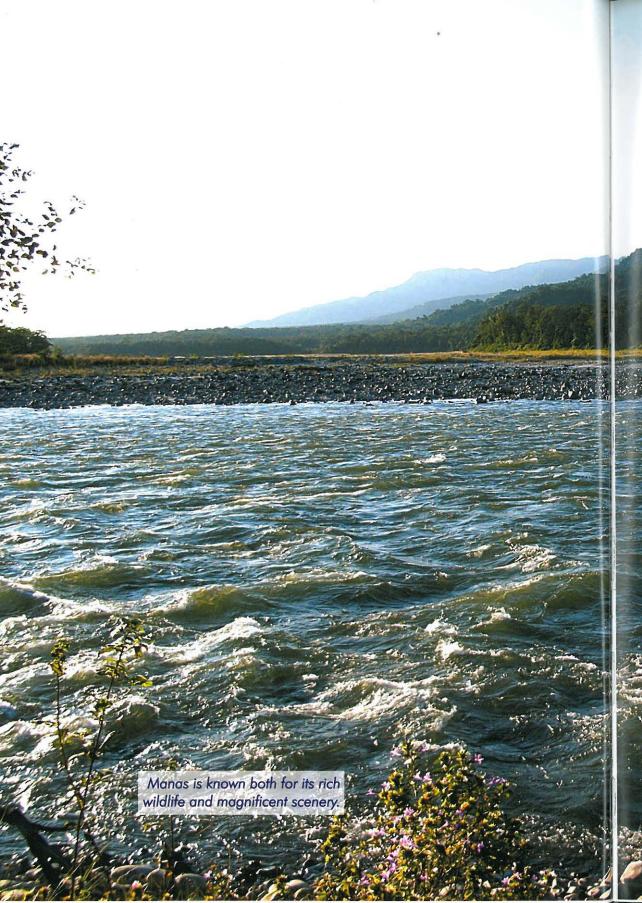
Kaziranga National Park

- ▶ 1902 Proposed for protection of Rhinoceros.
- 1908 Declared a Reserved Forest.
- 1916 Declared a Game Reserve.
- ▶ 1950 Declared a Wildlife Sanctuary.
- 1974 Upgraded to a National Park (Assam's first) with 430 km² (with additions, it is now 850 sq. km.).
- 1985 Inscribed as a World Natural Heritage Site.
- 2007 Notified as a Tiger Reserve with 1,033 sq. km.

MANAS









ore than a hundred years ago, in 1902, the British, particularly a bureaucrat, J.C. Arbuthnott, mooted a proposal for protection of MANAS along with Kaziranga and Laokhowa, for saving the small number of Great Indian One-horned Rhinoceros from extinction. In 1907, Manas was notified as a reserved forest, one year ahead of Kaziranga. In 1928, Manas was upgraded as North



A Hog Deer doe. Such spots on the body of Hog Deer often confuse general tourists who treat them as 'Chital'.

Kamrup Game Sanctuary and in 1950 it became a full-fledged wildlife sanctuary. By now, its fame had travelled the world and in 1985 UNESCO listed Manas as a World Heritage Site for its rich biodiversity and outstanding scenic beauty. Even as trouble was brewing internally owing to local political unrest, in 1989, Manas was named a biosphere reserve and in 1990, a core area of 500 square kilometers was designated a national park. The Manas National Park (26°35′-40′N, 90°45′- 91°16′E) is located in Baksa (Bansbari and Bhuyanpara ranges) and Chirang (Panbari range) districts of Assam. It covers the Himalayan foothills and Bhabar-Terai zones, with tall elephant grass and moist deciduous forest as the dominant habitats.

Tiger sightings in Manas were never easy. Although the big cat survived the onslaught on Manas to some extent, the flagship species is nowhere near as abundant as it was pre-1990 phase. It is very unlikely that there are more than 22 tigers alive in the core and perhaps another 18-25 in the buffer. When people think of poaching,



Red Muntjac or Barking Deer between Koklabari and Doimari. An Irrawaddy or Hoary-bellied Himalayan Squirrel. It is very common all over.



the first things that come to mind are images of skins and bones of tiger, or ivory and rhino horn. Equally deadly is the loss of the carnivore's prey base – the many deer, wild boars and buffaloes that were steadily sold for meat in the local bazaars. Experts know that this has always been a key reason for diminishing tiger population across India. And when their food is taken away, tigers will stray into neighbouring villages in search of cattle. Which means, many of them end up being poisoned or shot.

While everybody was busy focussing on the tigers of Manas, the Indian Onehorned Rhinoceros made an unheralded exit from the Park. From an estimated population of around 95 to 100 animals in 1989, numbers dwindled to less than 10 in post-1993! At one stage, it was believed to have been completely extirpated. A reintroduction programme has been undertaken since 2006 and a few animals from Kaziranga and Pabitora have been released. Elephants suffered in a similar fashion, but have now recovered to a great extent. And what of the fate of the rare Wild Water Buffalo? From an estimated 1,000 plus in the mid-1980s, the numbers have



A large Makhna or tuskless male elephant in Manas.



A Small Indian Pratincole.

plummeted to under 250! For some reason (probably because they could leave the vulnerable grasslands and take to the hills) Gaur and Sambar have managed to do quite well in the northern parts of Manas, where less wildlife blood was spilled. Manas is a stronghold for two small and lesser-known mammals, the Pygmy Hog and Hispid Hare. Because of their size and preferred dense grass habitat, they were probably not exposed to large-scale poaching. Manas is the only viable habitat for the 'Critically Endangered' Pygmy Hog in the world. Himalayan Black Bear, Sloth Bear, Clouded Leopard, Leopard Cat, Golden Cat, Fishing Cat, Jungle Cat, Marbled Cat, Chinese Pangolin, Chinese or Crestless Himalayan Porcupine, Golden and Capped langurs and the Rhesus and Assamese macaques and Slow Loris are other noteworthy mammals. The Golden Langur is found in areas west of the Manas River, while the Capped Langur is found east of the Beki. The Serow, larger of the goat-antelopes, comes down to the edge of the hills in winter. Manas has five species of deer including the Chital. The Dhole or Wild Dog is found widely but appears sporadically.



A Red Junglefowl cock. This is the ancestor of all the domestic breeds of chicken in the world.



A Burmese Rock Python.

The Jackal has become rare as its meat is considered a delicacy by some people. The Gangetic Dolphin is occasionally found in the southern fringe during the monsoon.

There are records of a rare turtle, the Khasi Hills Terrapin or Assam Roofed Turtle. The Gharial, which was present in both Manas and Beki rivers till around 1960s, is perhaps extinct. Manas has the highest number of threatened birds among all the Important Bird Areas in India, along with Kaziranga. Sighting of the endangered Bengal Florican is assured in Koklabari. Three species of hornbills are seen in good numbers – the Great Pied, Wreathed and Oriental Pied. The Rufous-necked is occasional, mainly in winter while the Grey Hornbill is rarely seen as Manas is its easternmost limit. The endangered Greater Adjutant is also occasional while the Lesser Adjutant is regularly seen. Among other threatened birds, there are records of Pallas' Fish Eagle, Greater Spotted Eagle, Marsh Spotted Babbler, Black-breasted Parrotbill, Hodgson's Bushchat, Bristled Grass Warbler and the Yellow Weaver or Finn's Baya.

A majestic bull Gaur or 'Indian Bison' between Koklabari and Daimari.





Rafting on the swiftflowing Manas river is a major attraction in the National Park.

Poaching is still a serious concern. Since the late 1990s, the main course of the Manas River has shifted and as a result the Beki River, which used to be fordable in winter, has become inaccessible to protectors. This makes the area between these two rivers vulnerable to felling and poaching. Notices have been issued to the gaon burhas (village headmen) and the lessees of the markets by me while I was Deputy Commissioner of Baksa. A special raid that I personally organised through the local police, in the company of the Central Reserved Police Force in December 2004 resulted in the recovery of a lot of animal parts and snares. Another raid by the 24 Punjab Regiment resulted in the arrest of two hardcore poachers in March 2005. These constant raids at the instance of the district administration have deterred the poachers of Kahibari and Bamonkhal to some extent. Many have already abandoned their trade and some are now even helping the Rangers of Bansbari and Bhuyanpara to patrol the area. There are other issues of concern. Bhutanese vehicle traffic along the Bansbari-Mathanguri road is a hugely disturbing factor. But we were told that this will be reduced when the road on the Bhutan side is completed by around 2008 (how will this affect the wildlife in that region is something that time will tell). A highway has been proposed through the eastern part of the core area near Kamardwisa, linking Bhutan. And new cement factories have been established at Nganglam. These developments should worry everyone who has the best interests of Manas at heart. I had asked the PWD (NH) Division to divert the last stretch of the highway outside the Park boundary and also to make provisions for at least three flyovers to act as underpasses for wildlife movement. They have agreed to that gladly, but instead of three, two bridges were provided. Signs of wildlife movement below the justcompleted flyovers have proved that it is a success.

OPERATION RECOVERY: The year 1996 saw the first attempt to revive Manas, when the late Nagen Sharma, the then Forest Minister of Assam camped in Manas for a few days. The years 1998-99 witnessed events taking a downward trend again. In 2003-04, however, things started to look up when Pradyut Bordoloi took over as the Forest Minister. I had the opportunity to work as the Joint Secretary in the Environment & Forest Department at that time. Some hard decisions were taken that resulted in 'relative' overall improvement. The notification of the Chirang-Ripu Elephant Reserve was also issued in 2003, which covered Manas. In December 2003, a new politico administrative set up came into existence in the form of the Bodoland Territorial Council under the 6th Schedule of the Constitution of India covering the entire northwestern Assam, which included the Manas National Park as well as its buffer. Although they may not be able to make any territorial changes, the Council has a major stake in the management and has shown keen interest in protecting the Park.

What Manas needs now is the immediate strengthening of protection measures including the revival of all pre-1989 anti-poaching camps and increased patrolling in the Panbari range and in the stretch between the Beki and Manas rivers under the Bansbari range. Both these rivers need to be monitored regularly as they are used by poachers as entry and exit routes. The core area should be extended west up to the Kanamakra River. A sustainable eco-tourism package benefiting locals can be taken up. As a conservation area, Manas has completed a century. The situation has improved as compared to the 1990s, but a lot of effort is still required to bring back its past glories. The late E.P. Gee wrote in *The Wild Life of India* (1964), "the area on both sides of the Manas river forms one of the best sanctuaries of India, where both plentiful wildlife and magnificent scenery are found together – a rare occurrence anywhere in the world." An outstanding World Heritage Site like Manas needs hard decisions, actions and constant monitoring if it is to regain its lost glory.

Manas National Park

- 1902 Proposed for protection of Rhinoceros.
- ▶ 1907 Declared a Reserved Forest.
- ▶ 1928 Declared a Game Reserve.
- ▶ 1950 Declared a Wildlife Sanctuary.
- ▶ 1973 Notified as a Tiger Reserve with 2,840 sq. km.
- ▶1985 Inscribed as a World Natural Heritage Site.
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