THE Kaziranga INHERITANCE

FOREWORD

KAZIRANGA: A NATIONAL INHERITANCE

The Kaziranga National Park is not just a well-known wildlife park and habitat for a variety of species of flora and fauna, it is also a precious and rare ecosystem that we must preserve and protect. The Park has been acclaimed as a World Heritage Site because of its remarkable contribution to the protection of a wide range of endangered species, but more specially *Rhinoceros unicornis*. The efforts of the Park authorities and of the people who have been integral to the ecosystem, to conserve the forest resources have set an example in environment protection. Kaziranga is home to the Bengal Florican and over 500 species of birds, and stands out for the density of tigers and its unique contribution to the preservation of the Indian one-horned rhinoceros. The captivating landscape of the Park and its picturesque greenery and surroundings have attracted visitors from all parts of India and the world, further encouraging efforts to protect wildlife and environment.

Forests are our shared inheritance. Man does not have the right to denude them of the many million species for whom they are an equally important habitat. Since humans have for centuries come to live in forests, we must also ensure that their needs for survival are addressed. Our Government has, therefore, decided to pursue policies that give a stake to tribal communities in the preservation of forest ecosystems to ensure sustainable development. Parks like Kaziranga remind us of the grandeur of nature and its many-splendoured beauty. I compliment the editors of this book, Shri. Bittu Sahgal and Shri. Ranjit Barthakur, for portraying the beauty of Kaziranga in this lavishly-illustrated volume. It is a visual treat, though as the authors would themselves agree, not a substitute for the actual experience of being there! Kaziranga is a proud inheritance for the people of Assam, a people that have been as generous to me, adopting me as their own, as they have been to nature! I am delighted that Shri. Sahgal and Shri. Barthakur have given us this book as a tribute to remember the centenary of the Kaziranga National Park.

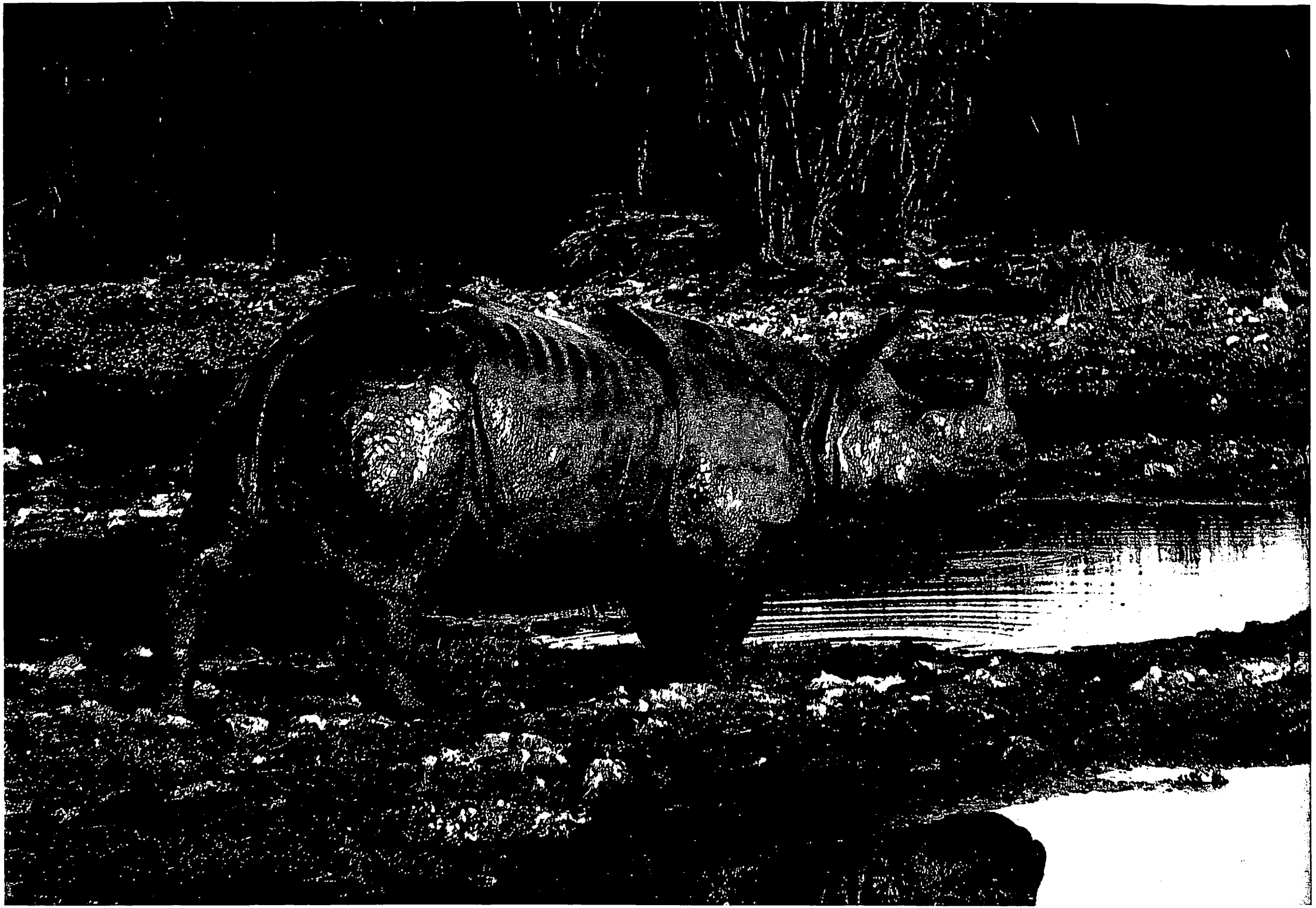
I convey my warm congratulations to the authors and my best wishes for the popularisation of this book and its message of living in harmony with nature.

Manmohan Singh

Dr. Manmohan Singh,
Prime Minister of India.

New Delhi, January 24, 2005

The great Indian one-horned rhinoceros has benefitted from the strict protection extended to Kaziranga. This modest wood and thatch hut houses deities worshipped by forest guards who continuously patrol their dangerous territories day and night.



Protecting a people's legacy

Kaziranga is Assam's living heritage that must be preserved as a vault of biodiversity, writes *Ranjit Barthakur*. He suggests that Northeast India's development-needs will best be served by passing human ambitions through processes and policies that enhance our 'nature capital'.

The Brahmaputra originates in Tibet, passes over rocky, mountainous terrain, through temperate wildernesses and rainforests, carving its way through the Himalaya to water Assam and Bangladesh, before ending its journey with the Ganges in the Bay of Bengal. For millions of years, the river watered the Indian subcontinent, shaped the terrain, crafted habitats and influenced the flora and fauna along its banks. Kaziranga's floodplain ecosystems have evolved according to the dictates of its geographical location and represent the very heart of the Indomalayan Realm and thus will they continue to evolve, always under the influence of this great river.

I consider myself privileged to have had Kaziranga as a part of my life over the last four decades. Early journeys with my parents through the Assam valley along National Highway 37 always took on a tinge of excitement as we approached Kaziranga. The landscape on either side of the road would change perceptibly and nature would reveal itself in exciting ways. Whenever I saw deer darting across the road, or rhinos and elephants grazing in full sight of us, the promise of still more mysterious sightings that awaited those who ventured deeper into the forest would play on my imagination. At St. Edmund's School, Shillong, where I studied, E.P. Gee's scratchy 8 mm. wildlife films served to whet my appetite for Kaziranga even more. And with every subsequent trip over the decades, new facets of this amazing wilderness continue to open. To my parents and E.P. Gee, I owe a debt of gratitude for sowing the seeds of appreciation and concern for nature and Kaziranga in me. Since then, I have always wanted to share these beautiful images of nature and Kaziranga with the world. In more ways than one, this book is a childhood dream come true. It is my hope that it will stimulate both love and respect for wild nature in the hearts of its readers.

As we reflect on a century of conservation and protection in Kaziranga, it would do us well to look into the future to try and consolidate past successes. The concept of Kaziranga as we know it today was born in British Assam in 1902 when J. C. Arbuthnott wrote to the Chief Commissioner of Assam expressing concern about the diminishing population of rhinos in Assam. Over the years, a number of people played differing roles in Kaziranga's survival – Gurdon, Playfair, Carter, Tottenham, Stracey, Barua, Milroy, Miri, Gee, Das, Lahan, Deb Roy and others. There can be no greater tribute to them than to keep their dream alive. The strict and diligent enforcement of rules by foresters like Lahan who led patrol parties on foot and conducted night patrols by boat and elephant back set the standard for protecting Kaziranga. But those who know Kaziranga well will confirm that, apart from protection, human modification – controlled burning of the grasslands – must be credited for turning Kaziranga into the last stronghold of the Indian one-horned rhino.

Today this 430 sq. km. wilderness is a veritable Noah's Ark. It not only houses the highest population of rhinos, the greatest density of tigers and a hugely significant number of wild buffalo, elephants and swamp deer but also has an amazing diversity of habitats and associated life forms including insects, amphibians, reptiles and birds. It is, in fact, a natural wonderland in which the call of the hoolock and the flight of the Bengal Florican symbolise the hope that humans will somehow find a way to live in harmony with nature. Kaziranga

Reflected in the still waters of a Kaziranga *beel*, this pachyderm, its skin glistening and slick with mud, was photographed by the legendary E.P. Gee more than 50 years ago. The rhino tends to visit the same wallows, middens and feeding grounds, making it easy prey for poachers. Grasslands are crucial to the survival of the rhino, but they also support a wide array of life forms including the Slender-billed Babbler *Turdoides longirostris* (previous page), which is listed as 'vulnerable' because of habitat loss.

The people who have protected and continue to protect the Kaziranga legacy should be personally and publicly recognised and rewarded. They are nation builders. They are the torch-bearers of the Kaziranga inheritance.

is a philosophy, it is an idea, a vision of the past that we must try and project into the future.

But not everyone shares this vision it would seem. Some would like to see the Assam valley turned into yet another heavy industrial hub. If we allow ignorance to overshadow voices of reason, our perception of 'needs' may obliterate what we merely hold in trust. We all want 'development', 'tourism'... 'growth'. But this desire must be tempered with a steely resolve – not at the cost of the biodiversity of Kaziranga... or Manas, or Dibru Saikhowa, or any of the other natural havens of Northeast India that have shaped the destiny of the Assam valley.

I believe the advancement of the people of Northeast India will be best served by institutionalising a philosophy of economics in tune with a visionary 'nature capital and conservation policy'. Current tourism strategies will then be replaced by a concept of 'wildlife socialisation' for humans, which is sustainable, equitable and more lucrative than has thus far been envisioned. The keepers of the inheritance that is 'Natural Assam' will need to strictly enforce this policy in their self-interest. Over-commercialisation would dilute this 'nature' brand equity. By contrast, if we go 'back-to-the-future' and rediscover the wisdom of our ancestors, we might just find the perfect balance between development and conservation that has thus far eluded the industrial north. The pressures and contradictions of an ever-increasing population that is becoming more consumerist by the minute, is fast resulting in the felling of forests for agriculture, minerals, timber and power. This, in my view, is the greatest threat to all of India's wildernesses, including Kaziranga.

T.S. Elliot said it best when he asked in *Choruses from the Rock:*

Where is the life we have lost in living?
Where is the wisdom we have lost in knowledge?
Where is the knowledge we have lost in information?
The cycles of heaven in twenty centuries
Bring us farther from God and nearer to the dust.

Today's threats to our wildernesses will be followed tomorrow by challenges to our future food and water security, which are more directly linked to the health of our forests. But 'necessity-driven greed' may lead us to overlook such realities. The agricultural community, planners and leaders jeopardise our future with every additional forest and water source they sacrifice. They must be persuaded not to do so

There are no easy solutions. I have heard people who believe that vanishing species are a part of the evolutionary process and that erasing the rich biodiversity of the earth is but a consequence of the ascent of man. However, a corollary to the destruction of our biosphere is the destruction of the life-support systems that will inevitably signal our own descent.

Those who have protected and continue to protect the Kaziranga legacy should be personally and publicly recognised and rewarded. They are nation builders. They are the torch-bearers of the Kaziranga inheritance. One hundred years from now, if Kaziranga is to be prevented from becoming a footnote in history, as so many other once-rich Assamese forests have become, it will be largely because of its frontline defenders who man the outposts and boundaries of the Park today.

Kaziranga is best known for its rhinos, but its fortress home has also protected a whole range of herbivores including this sambar deer seen framed elegantly by its verdant forest.

The Pride of Assam

Celebrating a success story

Northeast India has always been a treasure trove of biodiversity. Kaziranga is probably one of its most visible symbols. In an age of conservation reverses, this is one of the Indian subcontinent's most significant successes, suggests *Bittu Sahgal*.

Ranjit Barthakur and I sat on a large log watching otters fish in the Diphlu river. We paused a while, to take in the throb of life that is Kaziranga, on the way back from Debeswari. We had seen two Bengal Floricans rise and then float down like balloons, in a dance ritual designed to impress females hidden in the tall grass. We also saw where a tiger, elephant and turtle had left telltale footprints when they crossed a dry sandy riverbed, no doubt at different times of the day.

Across the river from where we now sat in silence, two rhinos made a quick appearance and then vanished into their veiled grassland world. They were followed by a small herd of elephants whose trumpeting we heard long before they revealed themselves. A decidedly fishy smell and silvery scales strewn about the log suggested we were not far from the underground otters' holt. The whole of the Assam valley, the whole world was once this ordered, this peaceful, I thought to myself as I savoured the moment.

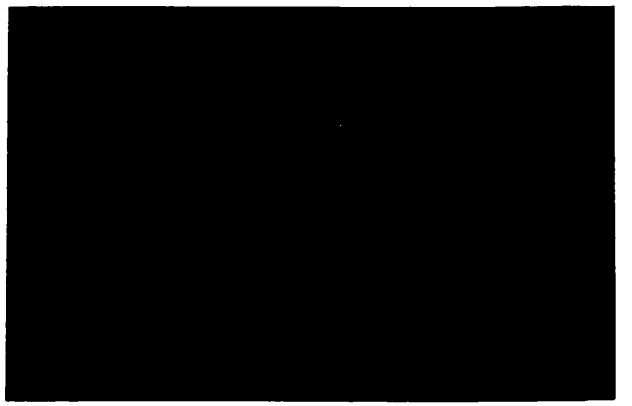
Ranjit was born in Assam and it was on his invitation that I first visited Kaziranga almost a decade ago. Visiting and defending wild places has virtually become the purpose of my life, and I already knew pretty much all that had been written about Kaziranga before I reached, but nothing could possibly have prepared me for the aura of the grassland home of the Indian one-horned rhino.

From the earliest days of my involvement with wildlife in the 1970s, I had heard stories of the magnificent Northeast from the likes of the late Dr. Sàlim Ali and Humayun Abdulali. I had also read E.P. Gee's *The Wild Life of India* from cover to cover. But sitting on that log and listening to Ranjit speak about 'his' world and hearing the slosh of rhinos and the yelp of otters filled me with Kaziranga in a way no book, including this one, could ever do.

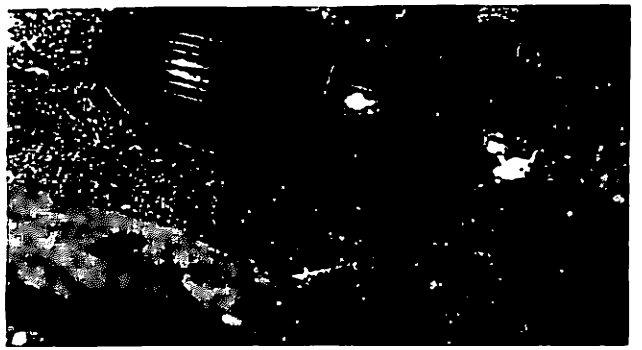
For centuries, this hidden part of India, extending all the way to Myanmar, was saved from the plough and axe because of its sheer inaccessibility. "When most of India's wildlife has vanished, somewhere in the Northeast a wood duck will still be whistling," said Dr. Sàlim Ali to me once, commenting on a proposed manuscript for *Sanctuary*, the magazine I have edited for 25 years. He was not to know that in the decade after he passed away in 1987, this protective isolation would be shattered by a progressive series of roads, mines, dams and other human 'development' projects that brought humans closer to the secret nooks and havens from where wild creatures were driven away to who knows where.

Speaking easily from knowledge born of years spent in the Northeast, Ranjit told me about the 'Seven Sisters' – the political states of India into which the Northeast has been divided – Assam, Arunachal, Manipur, Meghalaya, Mizoram, Nagaland and Tripura. He spoke of their incredible biodiversity, their unique human cultures and their crucial biogeographic location on the cusp of the Indomalayan Realm. "This river flowing gently by will turn into a raging torrent when the waters from the hills of Karbi Anglong come hurtling down just a month from now," he said. Adding that the mighty Brahmaputra, on whose banks we sat earlier that morning, sipping a cup of black tea offered to us by a forest guard, would turn into an even more wild and untamed surge.

Kaziranga is a child of the Brahmaputra river valley, which is in turn locked between the Eastern Himalaya to the north and the



A female capped langur, infant in tow, caught in the act of launching a gravity-defying leap to a nearby feeding tree. These primates inhabit dense deciduous and evergreen forests and their future is linked to the survival of their closed-canopy forest home. Smooth Indian otters (previous page) patrol their watery domain in the Kaziranga National Park in search of fish, though they are not beyond preying on ground birds either. Otters symbolise the health of their aquatic kingdom, which is also crucial to the food security of large heronries.



Delightful but deadly, the beautiful, purple-hued water hyacinth is an invasive plant. It clogs Kaziranga's waterways and crowds out local aquatic plants vital to large and small life forms, including rhinos, elephants and beetles such as this horned or bess beetle. Beetles are among Kaziranga's most efficient decomposers. Spiders are also a critical component in the food chain. Their gossamer webs adorn virtually every last patch of Kaziranga's famous grasslands.

ranges of Garo, Khasi, Jayantia, Mikkir, Cachar and Barail hills to the south. This climatic and geographic variation results in a special mix of plants and animals found almost nowhere else on earth.

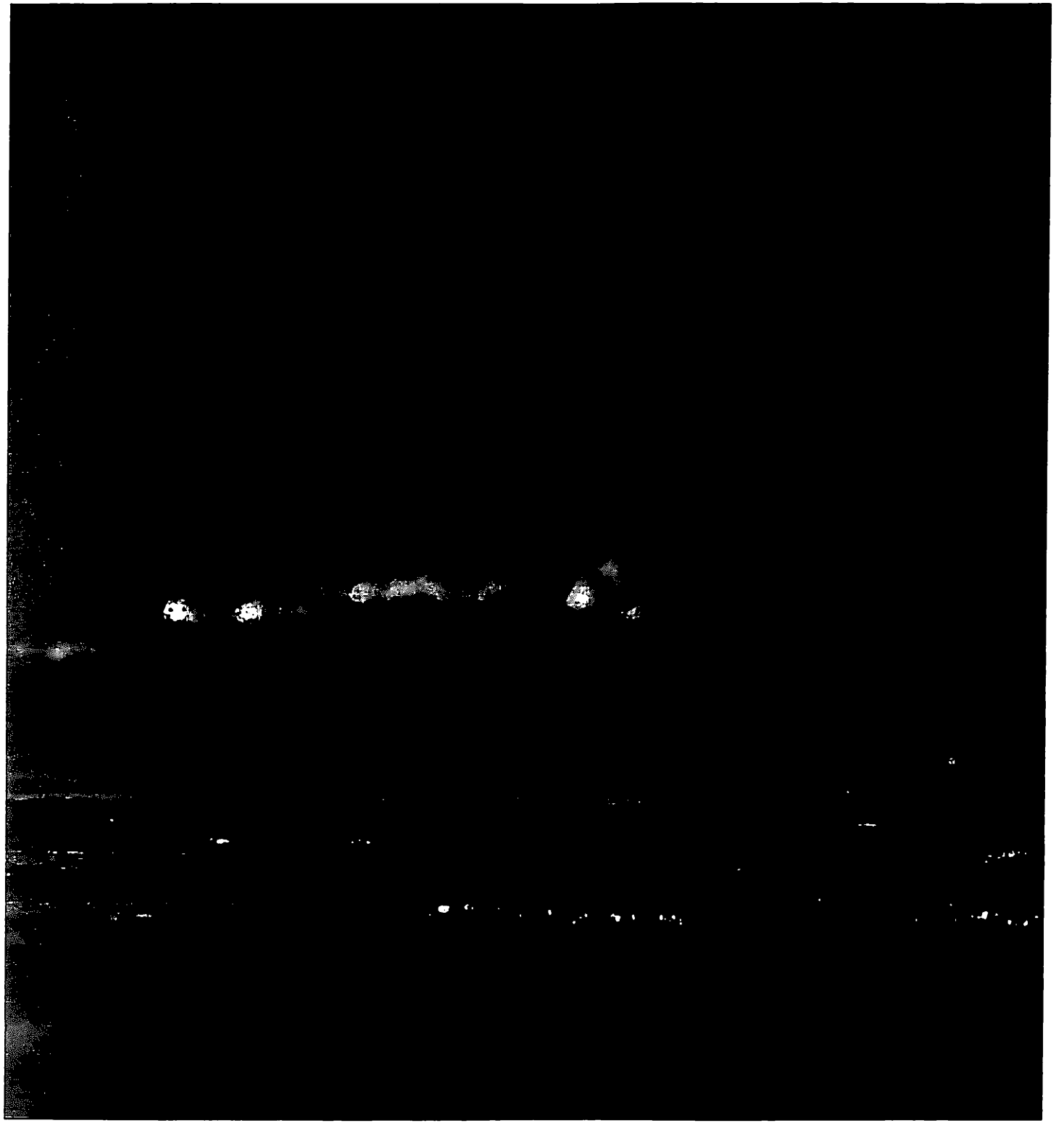
Here within a 430 sq. km. grass and forest asylum that is protected like a fortress, alongside the rhino, a whole host of animals have found refuge. I said a silent prayer for all those far-sighted people who lavished protection on Kaziranga's untamed wilderness down the ages. And I hoped Kaziranga's progress from a Reserved Forest to game sanctuary, to wildlife sanctuary, then national park and World Heritage Site, would continue in the days ahead to include the hill ranges of Karbi Anglong, where wild animals were once able to go to escape the high flood. The Park authorities have been working on such 'additions' for several years and their greatest support for this endeavour now comes from the people of Assam for whom Kaziranga is a symbol of both pride and culture.

Like a moth to a benign flame, I have returned time and again to Kaziranga over the years only to discover a new facet, a new personality, with each successive trip. No one can be unimpressed with the sight of rhinos, wild buffalo, elephants, swamp deer and gibbons. This is what 50,000 people visit Kaziranga each year to see. But I do sometimes wish they could be persuaded to turn their attention to some of the less obvious delights on offer. From where I sat next to the otters' holt, for instance, I noticed a praying mantis on a very low bush, no doubt attracted to the possibility of snapping up a fly or two from the hundreds buzzing around the remnants of the otters' fish meal. Watching over its waterways, from a vantage point on a fig tree near us, a Grey-headed Fish Eagle screamed its domination over its territory, as if to remind us that there is more and then still more to Kaziranga than first meets the eye.

When we reached Wild Grass, the residential lodge that Ranjit and A.K. (Manju) Barua had co-founded in a village just outside Kaziranga in the late '80s, I learned still more about Assam, Kaziranga and its life-loving people from lodge managers, caretakers and staff – all Assamese, all friendly, all fiercely proud of and protective about Kaziranga. We also met young Maan Barua, an ornithologist dedicated to Kaziranga's protection, who represents the hope of a new generation.

Poaching had once almost wiped out the rhino. Countering poachers and managing the grasslands to ensure the survival of the rhino, now consumed the vast bulk of the time and resources available to the field staff of Kaziranga.

As he shifted easily between Assamese and English, I listened on as the soft-spoken Bhupen Talukdar, then a Forest Ranger at Kaziranga, described the monumental task they had on hand. Shorn of romance and niceties, every single day that they entered the rhino's domain, their life was at risk. I learned more about wildlife protection from him, Pankaj Sharma and D. D. Boro in



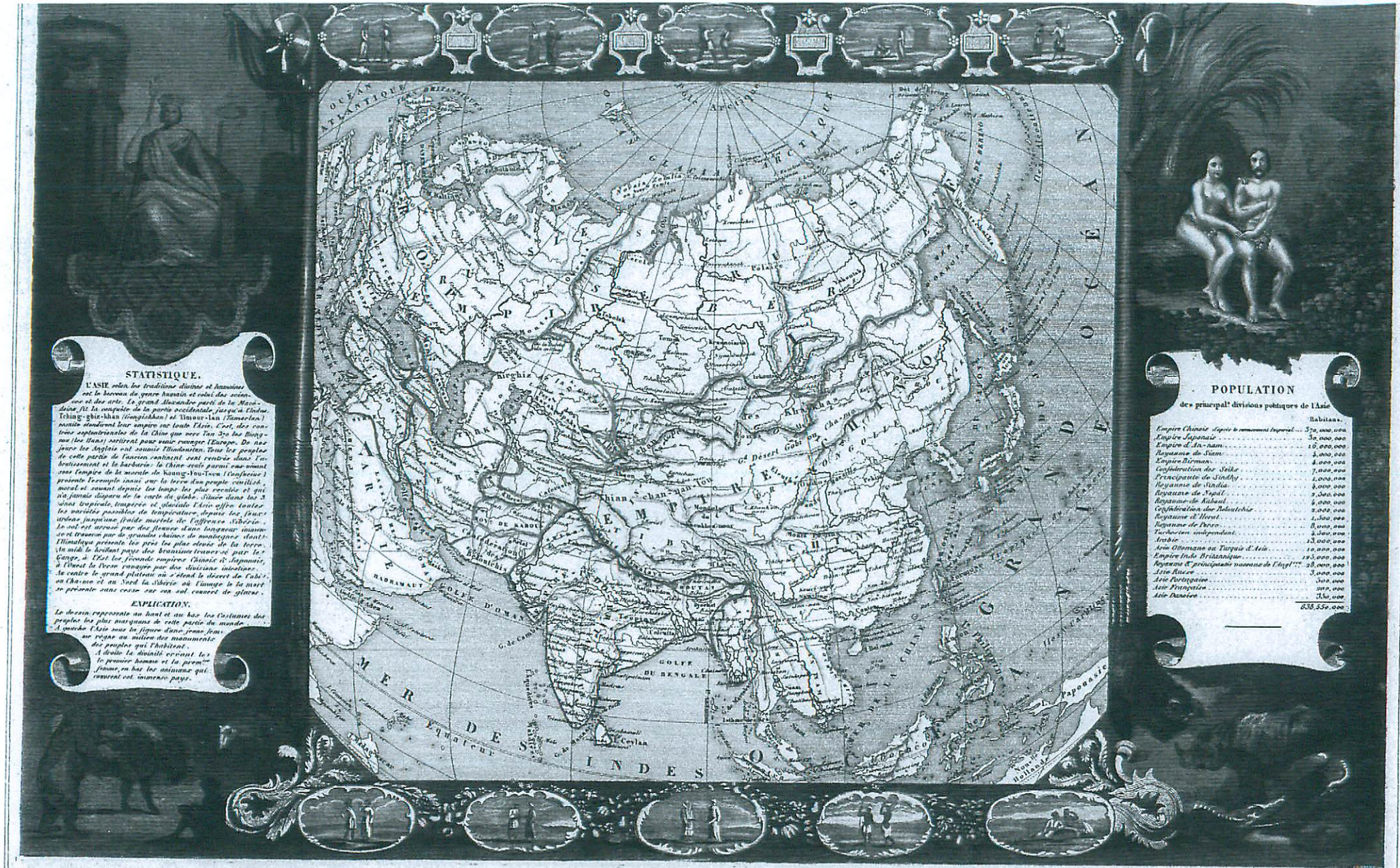
A Gangetic river dolphin comes up for air in the Brahmaputra river. This endangered two-and-a-half-metre long mammal navigates using sonar and feeds on crustaceans and fish that breed and multiply in Kaziranga's protected wetlands.

the five days of my first trip to Kaziranga than I had in years of strategy sessions involving city conservationists, lawyers and officials. Something they were doing in Kaziranga was remarkably right. Even as rhinos were being exterminated by poachers in the Manas Tiger Reserve, the numbers of this ancient mammal were on the rise in Kaziranga.

And that was not all. Following the sage advice of stalwarts including Stracey, Milroy, Miri, Gee and later, Lahan and Deb Roy, Kaziranga's protectors had managed to safeguard the geographical integrity of a large swatch of the Brahmaputra floodplain grassland, swamp and forest habitat. Nature responded to such efforts by 'rewarding' managers with the highest density of tigers per square kilometre found anywhere in the world. Birds too seemed to 'approve' and began to congregate each year in greater numbers on this wild and inviting piece of land that was located at the intersection of the Australasian and Indo-Asian flyways.

The field staff of Kaziranga has been mandated to 'maintain and wherever necessary restore the demographic features relating to the populations of all endangered, endemic, vulnerable and rare species of animals and plants with special focus on rhino, tiger and their habitat'. This and more they have done. In the process they have earned for themselves a well-deserved reputation for having implemented one of the most successful conservation initiatives of the subcontinent in the past 100 years.


BACK TO THE FUTURE



Géographie et Statistique par V. Levasseur, Ingénieur Géographe.

Gravé par Laguillermie, rue St. Jacques, 81.

Illustré par Raimond Bonheur, Peintre.

BACK TO THE FUTURE

One hundred years of conservation

Kaziranga's history has lessons for modern-day conservationists. The successes of the past are a beacon for the future. Then, as now, a few determined people fought against a tide of opposition to protect an unbelievably valuable heritage.

Lyrical *Bihu* harvest songs and dances, motifs that speak of an ancient history, the azure-blue waters of the Brahmaputra, magnificent elephants and the great Indian one-horned rhino – Kaziranga is all these and more.

Five thousand years ago, rhinos roamed the Indus river plains and records exist of these prehistoric creatures in Kashmir and Peshawar. Rhino hunts were commonplace in Moghul times. When the East India Company took charge of the Assam valley in 1826, rhinos must have been doing very well indeed. But within 10 years tea, which used to grow naturally in Assam, was 'discovered' by the British. Soon a combination of cultivation, grazing and hunting, began to take a toll on the great pachyderms.

Today, the animals are found in southern Nepal, north Bihar and Bengal and Assam. The latter had a sizeable population in the 1900s, but hunting parties of the Maharaja of Cooch Behar took a severe toll, killing as many as 207 rhinos between 1871-1907. So rare did the animal eventually become that the Cooch Behar hunting records reveal only one rhino killed in the latter years, between 1902-07. The *terai* near the Duars of North Bengal was the only place where a relatively sizeable number still survived.

The advent of the railways induced labourers and settlers to migrate in large numbers to the Brahmaputra valley. This only compounded the damage done by hunting and habitat destruction. *Rhinoceros unicornis* was being inexorably pushed towards extinction.

But the rhino did have some friends. And public opinion among the British began to move in favour of protecting these magnificent animals.

J.C.Arbuthnott, Esq., C.I.E., I.C.S., Officiating Commissioner of the Assam Valley Districts wrote to the Chief Commissioner of Assam, B. Fuller, on November 4, 1902 stating that:

The animal which was formerly common in Assam, has been exterminated except in remote localities at the foot of the Bhutan Hills in Kamrup and Goalpara and in a very narrow tract of country between the Brahmaputra and Mikir Hills in Nowgong and Golaghat where a few individuals still exist. There is, I think, still time to preserve the very few that are left. I trust therefore that the Chief Commissioner will see his way to take measures for the preservation of a species, which is now verging on extinction before it is too late.

And it was the Chief Commissioner's response to Arbuthnott's concern on December 18, 1902, that set the foundation for Kaziranga's birth.

... the Chief Commissioner agrees with you in thinking that it would be most regrettable if the rhinoceros became extinct in Assam, but that it would be impossible without special legislation to penalise the unlicensed shooting of this animal, and that such legislation is not very likely to be undertaken... However, gladly consider the possibility of establishing an asylum for the rhinoceros by taking up as Reserved Forest a sufficient area of suitable land...

Arbuthnott then wrote to the Secretary to the Chief Commissioner of Assam on August 28, 1903 recommending three areas – the Bhutan foothills in Northwest Kamrup that had been proposed as a reserve by Major P.R.T. Gurdon who had surveyed the area; the area west of Laokhowa and north of Juria in Nowgong and the area between the Leterijan and the Brahmaputra rivers in the Golaghat sub-division of Sibsagar in the vicinity of Kaziranga.

A CHRONOLOGY OF PROTECTION

November 4, 1902: J.C. Arbuthnott expresses concern about the depleting rhino populations to the Commissioner of the Assam valley districts.

August 28, 1903: J.C. Arbuthnott suggests three areas to be protected.

March 15, 1904: Proposals from Mr. Arbuthnott and Major Gurdon agreed to in principle.

December 22, 1904: Chief Commissioner approves proposal.

June 1, 1905: First formal notification declaring the government's intention to constitute Kaziranga as a Reserved Forest.

January 3, 1908: Declared as a Reserved Forest.

November 10, 1916: Upgraded to a Game Sanctuary.

1938: First opened to the public.

1950: Declared a Wildlife Sanctuary.

1974: Legally notified a National Park.

July 10, 1985: 2nd Addition (6.47 sq. km. preliminary notified).

May 31, 1985: 3rd Addition (0.69 sq. km. preliminary notified).

June 13, 1985: 4th Addition (0.89 sq. km. notified).

June 13, 1985: 5th Addition (1.15 sq. km., preliminary notified).

December 1985: Notified as World Heritage Site by UNESCO.

May 28, 1997: 1st Addition (43.97 sq. km. notified).

August 7, 1999: 6th Addition (376.50 sq. km. notified).

1889: Kukurakata (15.93 sq. km.) and 1913: Panbari Reserved Forest (7.65 sq. km.) also under the administration of the Kaziranga National Park.

A map of old Asia showing Assam, which falls in the newly categorised Indomalayan Realm. Elephant-back surveys conducted by E.P. Gee (previous page) in Kaziranga, helped consolidate this wilderness, which he loved and protected to the day he died.

By the end of the century, the rhino population had plummeted in Assam. The *terai* areas near the Duars of North Bengal seemed to be their last stronghold. Elsewhere they had all but vanished. But then the species made a comeback.

All along the foot of the hills there is a strip of khair *and* karai *forest varying in breadth from about four miles to about half a mile with some swamp, near Oosla and Lahapara. The whole area does not contain a single village, for people will not live there for fear of the* Bhutias. *The* Kacharis *have no rights in the proposed reserve, but they go up sometimes to fish and also to shoot.*

On March 15, 1904, the proposals from both Mr. Arbuthnott and Major Gurdon were agreed to in principle subject to the condition that the reserves did not injure existing cultivation, did not afforest land that was suitable for cultivation and did not expend too much public money. The Conservator of Forests was asked to report on the cost of employing game-keeping staff and to specify whether the Assam rules needed to be amplified to prevent a licence or permit holder from shooting in the Reserved Forest. One of the suggestions was that a few foresters and forest guards be employed and that no Deputy Ranger be appointed.

The Deputy Commissioner, Sibsagar, opined that:

The area should be reserved for this purpose as soon as possible. No difficulty will be experienced in creating this reserve, and the only expenditure, which would be involved, would be maintenance of forest guards or keepers who would be appointed for the protection of the area.

He reported that Kandulimari on the north of the Diphlu river and south of Mariahati Mirigaon with six or seven families was the only village here and that the land was not suitable for cultivation. Making it suitable for cultivation would involve repairing the old embankment built in the time of the Assam Rajas and this would be expensive and difficult because of the presence of wildlife.

On September 20, 1904, E.S. Carr, the Conservator of Forests recommended that Kaziranga be reserved and that two foresters be employed at Rs. 15 per month and two forest guards at eight rupees per month – a total expenditure of Rs. 552 per annum. Suggestions to revise the rules for the regulation of sport hunting in Reserved Forests were also forwarded to the Chief Commissioner.

On December 22, 1904, the Chief Commissioner approved the proposal and requested the Conservator of Forests, Assam, to obtain the notification for the Kaziranga and Laokhowa blocks. The draft notifications were forwarded by Carr on January 16, 1905 and the amended rules for regulation on March 16, 1905. On June 1, 1905, Notification No. 2442R was issued. It read:

In exercise of the powers conferred by Section 5 of the Assam Forest Regulation VII of 1891, *the Chief Commissioner hereby declares that it is proposed to constitute as Reserved Forest in the interest of the preservation of game the lands described in the schedule hereto annexed, and appoints the Deputy Commissioner of the Sibsagar district to be the Forest Settlement Officer to enquire into and determine the existence, nature and extent of any rights claimed by or alleged to exist in favour of, any person in or over any land comprised within the limits as described in the schedule hereto annexed, and to deal with the same as provided in Chapter II of the Regulation.*

Under the provision of Section 5, sub-section (2) of the Assam Forest Regulation, VII of 1891, *the Chief Commissioner appoints the Divisional Forest Officer, Sibsagar, to assist the Forest Settlement*

WHAT'S IN A NAME?

Many fanciful tales have been woven about the origin of the name, Kaziranga. The word *'Kazi'* in the local Karbi language means goat and *'rangai'* means red – "the land of red goats (deer)". A second story attributes the name to an old, childless couple Kazi and Rangai who are believed to have approached Mahapurus Madhabdeb, a disciple of the founder of the Vaishnava sect, Mahapurus Sankardeb who had camped near Narmora *beel*. On the advice of the saint, they dug a huge pond in the area. The *Ahom* king, Swargdeo Pratap Singh, who was passing through the area was offered fish from this waterbody and was so delighted with its taste that he named the area as Kaziranga after the couple that had dug the pond. Yet another story suggests that Kazi, a young man who lived in the hills of Karbi Anglong fell in love with Ranga, a beautiful village girl from the plains of Assam. But their parents did not approve of the match and the two lovers could only meet fleetingly in the forest, which became their secret hideout. One day, the lovers vanished, never to be seen again, much to the dismay and distress of their respective parents. The couple became a symbol of undying love and the people of the region named the forest in which they met 'Kazi-Ranga' in their memory.

All lovely stories. But none that anyone can authenticate. Yet, no one who visits Kaziranga can remain unmoved, either by the magic of its legends and tales, or the sheer beauty of Kaziranga's grasslands, forests and swamps.

Lady Mary Victoria Curzon on a tiger hunt with her husband the Viceroy of India, Lord George Nathaniel Curzon. No written evidence exists to prove that she actually visited Kaziranga, but the belief that she did, and that she was the force behind the protection of the rhino, continues to gain credence with each passing day.

A RHINOCEROS HUNTED BY ELEPHANTS. UN RHINOCEROS CHASSÉ PAR DES ELEPHANTS.

Published & Sold Jan.y 1.1806. by Edw.d Orme, Printseller to His Majesty, 59, Bond Street, London

"Were it only the real sportsmen whom we had to deal with, the newly-made game laws might be sufficient. There are, however, certain persons who have few scruples against whom further restrictions have to be aimed." – **Major A. Playfair, Deputy Commissioner and Forest Settlement Officer, Sibsagar District**

Officer in enquiries prescribed by Chapter II of the Regulation in connection with the proposed reservation.
Under the provision of Section 15 of the Assam Forest Regulation, *the Chief Commissioner appoints the Commissioner of Assam valley Districts to hear appeals from the orders of the Forest Settlement Officer.*

The notification could, however, have been the result of more that one influence. The late S. Deb Roy, a professional forester of great repute, suggested sometime in the early 1990s that Lady Curzon, an American married to the then British Viceroy of India, had personally visited Kaziranga with one predominant wish – to set eyes on the mythical unicorn. In the event, she was disappointed when all she saw were footprints. This so deeply troubled Lady Curzon, it seems, that she influenced her husband, Lord Curzon, to issue a preliminary notification to declare Kaziranga, a Reserved Forest in 1905.

But no written record has yet confirmed any visit, or appeal to save the rhino by Lady Curzon. Nevertheless, the story continues to gain narrative momentum. More recently, quoting Lila Nath, a hotelier from Bokaghat, Nitin A. Gokhale and S.G. Kashyap suggested in their book *Kaziranga, the Rhino Century* that she had visited the Naharjan tea estate in January 1905 on invitation from its manager, a Mr. Forbes who was also Honorary Magistrate of what was then referred to as Nam-Doyang. Forbes is said to have asked a skilled tracker called Nigona Shikari to accompany Lady Curzon to show her a rhino from elephant back. Nigona did point one out, but it was too far and Lady Curzon was not convinced. He then dismounted and showed her the three-toed footprints left behind and asked Lady Curzon to compare them to the four toes of her elephant. At this point it appears, Lady Curzon asked how the rare rhino could be saved and Nigona responded by asking her to "Stop the *sahibs* from killing them."

That is just what her powerful husband is believed to have ordered. Lord Curzon left India in August 1905 and a year later, Mary Curzon died in London. Whether or not the story of Lady Curzon's involvement is factual, it was the painstaking efforts by concerned officials that seem to have paid off. An area of 56,544 acres of land was declared as a Reserved Forest on January 3, 1908. Subsequently, hunting, shooting and trapping of wild animals and fishing were completely banned by an executive order from H. Carter, the then Conservator of Forests, Eastern Circle. Some land opposite the Kuthori and Baguri villages was de-reserved on April 18, 1911 to provide villagers with access to the Moridiphlu river for water and cattle grazing and to enable the Hatikhuli and Kuthori tea gardens to continue despatching tea by boat. Since wild animals were exposed to hunters when they strayed to the vast area outside the Reserved Forest to feed on the green post-burn grass, an area of 16,347 acres was proposed to be added to the east of the reserve towards the Bokakhat Dhansirimukh road. Many objections were overruled and Major A. Playfair, Forest Settlement Officer and Deputy Commissioner, Sibsagar District forcefully said:

There are several keen sportsmen among them and it is an undoubted fact that the areas of their operations have been greatly restricted. Our object is to preserve the rhinoceros and the herds of buffalo in these parts, and were it only the real sportsmen whom

A lithograph of a fanciful hunt depicting elephants and a rhino in combat. Such incidents would hardly be plausible as the powerful herbivores would normally give each other a wide berth.

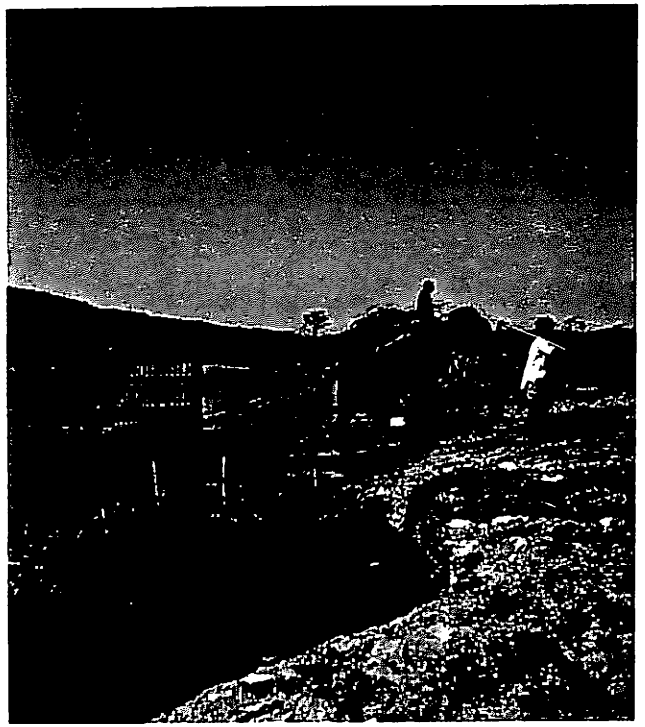
ELEPHANTS AND PEOPLE

In the late 1800s, 'sportsmen' would go on elephant-back in Kaziranga to shoot rhinos. Even today, riding-elephants are useful for going into dense areas that cannot be traversed on foot. The Forest Department still has around 40 elephants under its care and these are used both for patrolling as well as to charter tourists. In the event of a rhino charge, well-trained *mahouts* and experienced elephants will hold their ground, with the rhino stopping short when its bluff is called.

Elephants have been tamed for centuries in Assam to haul timber. They have also been used to transport captured rhinos for shipment to different parts of India and the world. Recent concerns about the welfare of elephants and the cruelty involved in training them are gaining ground. However, no one can deny the incredible bond that seems to form between man and elephant as *mahouts* get their animals to lift weights, enter rivers, back into position to allow people to climb atop them and, even pick up tiny objects, like watches, cameras and keys, when they accidentally fall during jungle jaunts.

The elephant is revered in Assam and in most of India. When the forests were vast, there were natural barriers between them and humans. Today, these have fallen. Plantations, roads, railway lines, dams, canals and mines interrupt ancient 'elephant walks'. This prevents the animals from moving between favoured-feeding areas and is the primary reason for conflicts between humans and elephants today.

In 1916, Kaziranga was declared a Game Sanctuary by an executive order passed by W.F.L. Tottenham, Conservator of Forests, Eastern Circle, Assam.



A rhino in a wheeled cage is pulled by an elephant to a stockade for a month's confinement, before being despatched to a distant zoo. No record was ever kept of how many rhinos died in pit traps, for each one taken alive. It stands to reason that a bulky animal falling from a height of two metres would suffer grievous harm. Poachers continue to use this deadly strategy to kill rhinos even today.

we had to deal with, the newly-made game laws might be sufficient. There are, however, certain persons who have few scruples against whom further restrictions have to be aimed. An alternative to constituting an addition to the Kaziranga reserve would be to prohibit entirely the shooting of rhinoceros for a certain number of years and then to issue only a limited number of permits per annum. I have consulted persons who are well acquainted with the game in the part of the district and the highest estimate made of the number of rhinoceros in the Kaziranga Reserve is 20 pairs.

In the event, 13,506 acres were added to the Kaziranga Reserve on January 28, 1913, excluding 2,841 acres of low-lying land from the proposed area to facilitate the transport of tea down the Diphlu and the Mori Dhansiri rivers. A proposal to add the entire north of the existing reserve from the confluence of the Diphlu and Dhansiri rivers with the Brahmaputra was taken up to further strengthen the rhinos' habitat, provide high ground as shelter during the flood and protect them from possible epidemics. This proposed area contained four temporary villages having an annual lease on the land. Nepali graziers also used the area and their eviction created widespread uproar. Current administrations might do well to take a lesson from the Chief Commissioner, who held firm, stating that grazing in such proximity to the Park could result in the spread of cattle disease to wild species. A total of 37,529 acres of land extending the Kaziranga Reserve all the way to the Brahmaputra river was notified in 1917.

What a remarkable and courageous lot of conservationists the rhino had found! *The Assam Rhino Prevention Act 1915* banned rhino hunts in *all* forests in the state. In 1916, Kaziranga was declared a Game Sanctuary by an executive order passed by W.F.L. Tottenham, Conservator of Forests, Eastern Circle, Assam.

A protective armour now clothed the rhino and the wildlife of Kaziranga. Half a century later a small parcel of 151 acres was added to the reserve on April 7, 1967. This was designed to provide a natural corridor for the animals to cross south of National Highway 37 to the safety of the Karbi Anglong Hills during the floods.

THE CONSOLIDATION YEARS

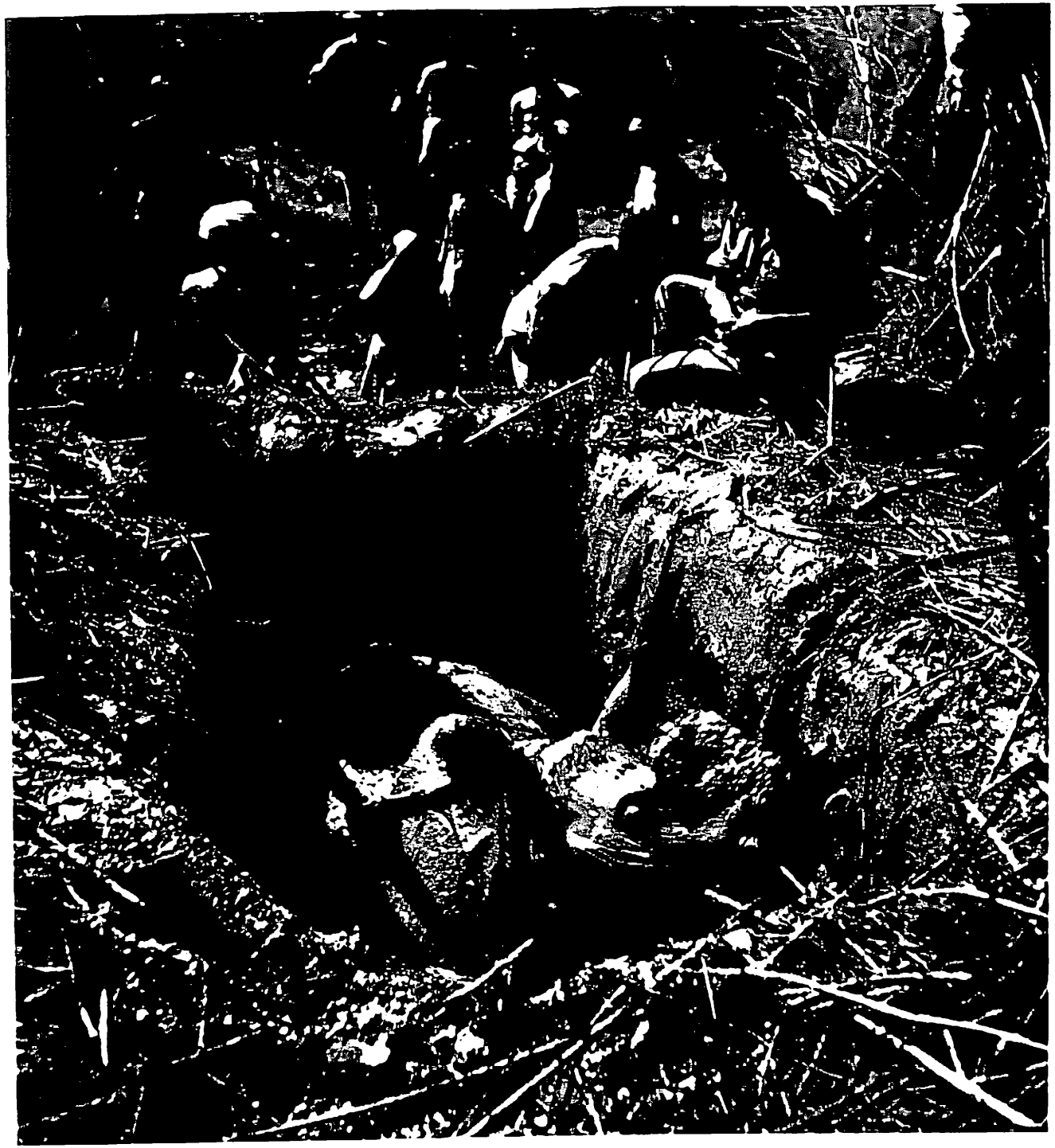
E.P. Gee, a tea planter and author of the book *The Wild Life of India* probably put it best when he said that:

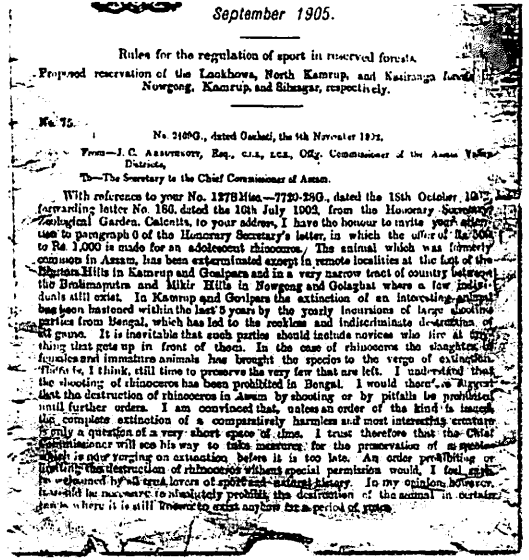
In the early 1930s, Kaziranga was a closed book, a sort of terra incognita *completely left to itself by the Forest Department. I remember trying to get permission to go there in 1934, but the rather lame excuse of the British D.F.O. was, "No one can enter the place. It is all swamps and leeches and even elephants cannot go there."*

Shortly afterwards the very fine Chief Conservator, A.J.W. Milroy, took on the poaching gangs and suggested opening Kaziranga for visitors.

Years later, B.N. Talukdar and A.K. Barua confirmed Gee's assessment of Milroy when they wrote in their book, *Status of Tigers in Assam*:

Milroy, a keen forester, a strict disciplinarian, was a man of exceptional character. As a young officer, he joined the elephant khedda *service in 1909. He actually humanised the elephant catching industry by revising existing rules, which the Government approved for enforcement in 1922. Milroy's scheme meant that*





September 1905.

Rules for the regulation of sport in reserved forests.

Proposed reservation of the Lankhowa, North Kamrup, and Kaziranga forests in Nowgong, Kamrup, and Sibsagar, respectively.

No. 75.

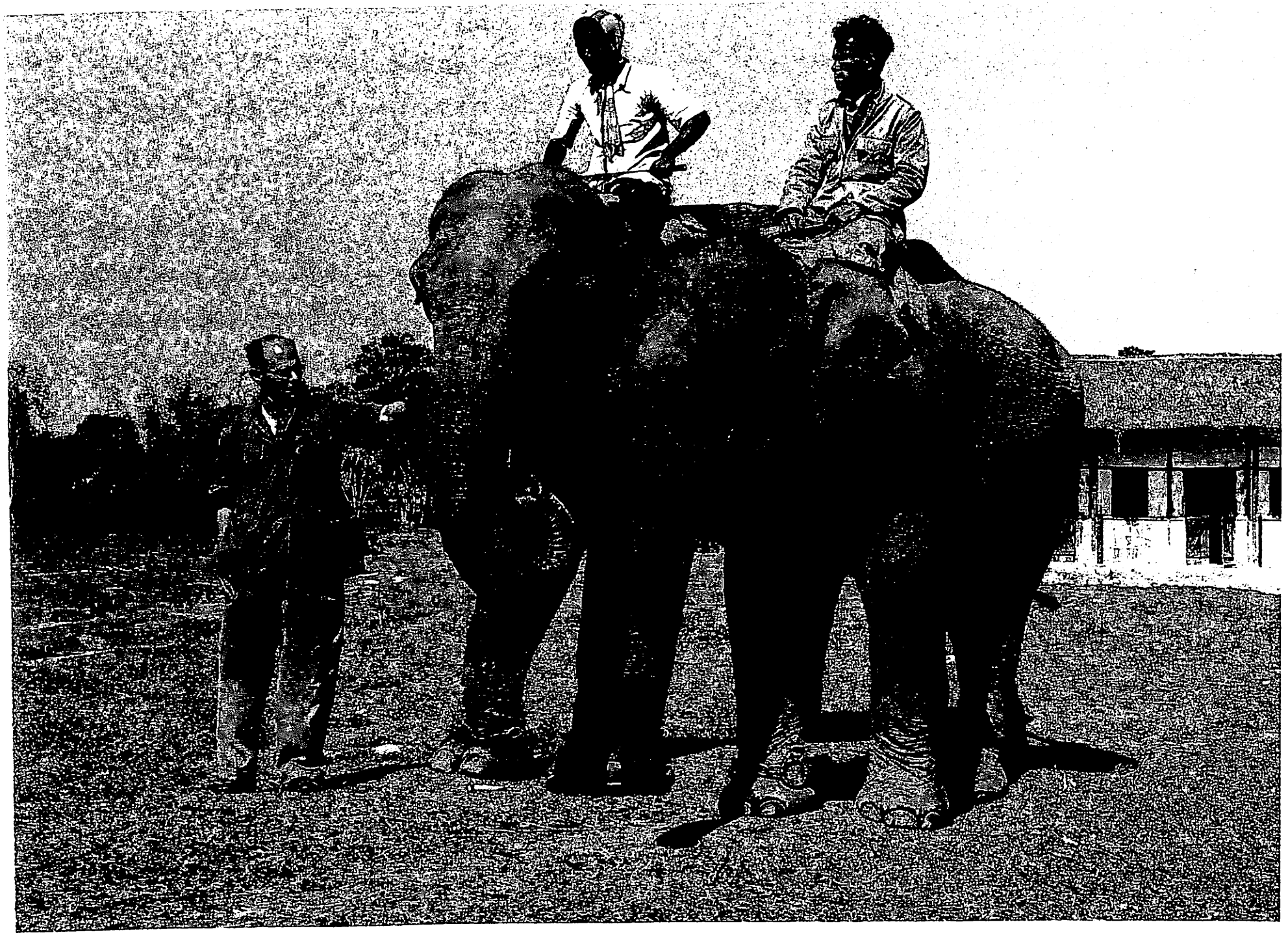
No. 2169G., dated Gauhati, the 9th November 1872.

From—J. C. ARBUTHNOTT, Esq., C.S., C.S.I., Offg. Commissioner of the Assam Valley Districts,

To—The Secretary to the Chief Commissioner of Assam.

With reference to your No. 1278 Misc.—7720-29G., dated the 15th October 1872, forwarding letter No. 180, dated the 10th July 1872, from the Honorary Secretary, Zoological Garden, Calcutta, to your address, I have the honour to invite your attention to paragraph 6 of the Honorary Secretary's letter, in which the offer of Rs. 500 to Rs. 1,000 is made for an adolescent rhinoceros. The animal which was formerly common in Assam, has been exterminated except in remote localities at the foot of the Bhutan Hills in Kamrup and Goalpara and in a very narrow tract of country between the Brahmaputra and Mikir Hills in Nowgong and Golaghat where a few individuals still exist. In Kamrup and Goalpara the extinction of an interesting animal has been hastened within the last 5 years by the yearly incursions of large shooting parties from Bengal, which has led to the reckless and indiscriminate destruction of the game. It is inevitable that such parties should include novices who fire at everything that gets up in front of them. In the case of rhinoceros the slaughter of females and immature animals has brought the species to the verge of extinction. There is, I think, still time to preserve the very few that are left. I understand that the shooting of rhinoceros has been prohibited in Bengal. I would therefore suggest that the destruction of rhinoceros in Assam by shooting or by pitfalls be prohibited until further orders. I am convinced that, unless an order of the kind is issued the complete extinction of a comparatively harmless and most interesting creature is only a question of a very short space of time. I trust therefore that the Chief Commissioner will see his way to take measures for the preservation of so remarkable a beast is now verging on extinction before it is too late. An order prohibiting or limiting the destruction of rhinoceros without special permission would, I feel sure, be welcomed by all true lovers of sport and natural history. In my opinion however, it would be necessary to absolutely prohibit the destruction of the animal in certain areas where it is still known to exist anyhow for a period of years.

Rhinos from Kaziranga often found their way to zoos around the world including Whipsnade, U.K. (above). Pits would be dug on well-frequented rhino paths or *dandis* and covered with grass and sticks. Arbuthnott's 1905 letter, reproduced above, advising against the capture of a wild rhino for the Calcutta Zoo (for a consideration of Rs. 1,000) was a courageous and far-sighted step, considering the pro-*shikar* mood of the day.



Milroy knew something that most people of the day (or today for that matter) did not, that the key to the rhino's survival was habitat protection.

the kheddas *would be run departmentally and elephant catching would not be a "free-for-all" for European adventurers (mostly tea planters) who went in partnership with Assamese* mahaldars.

Earlier elephant-capture ended up killing more elephants than were 'collected' from the wild.

A hard taskmaster, Milroy wrote in 1929:

... the Forest Department, needs educating up to the fact that wild animals and the study of their habits are sources of great interest and delight to men of real culture throughout the civilised world, and that it is our duty to preserve them in reasonable numbers and places such as the interior reserves, where they can do no harm to any one.

Unsupported, Milroy pressed on. In 1928, Manas was over-run by poachers, but he got it declared a Game Sanctuary. Two years later he launched an offensive that ended up nabbing an ex-*Subedar* of the East Bengal Rifles, who was arrested for dacoity. The message went out to all and sundry... wild animals were no longer easy targets

Even three decades after it was officially protected, however, the sheer inaccessibility of Kaziranga dissuaded most Britishers from entering its confines. Determined poachers, however, continued to conduct their nefarious trade.

Milroy now honed in on an energetic and diligent officer, Mahi Chandra Miri, Extra Assistant Commissioner (EAC) Forests, in Kaziranga in 1934. Miri set base at Baguri and threw himself into the task of protecting the rhino. He began by exploring the hidden trails and nooks of Kaziranga and succeeded in staunching the poachers' impact. Kaziranga gained international attention and zoos increasingly began asking for rhinos, which would be caught using pits dug in the middle of *dandis* (rhino paths), laid over with sticks and grass. Once a rhino fell in, it was removed and shifted to a wheeled cage (see image on page 32) pulled by an elephant. It was a different age with different values, but one cannot help wondering how many rhinos died agonising deaths this way for each one that was shipped out.

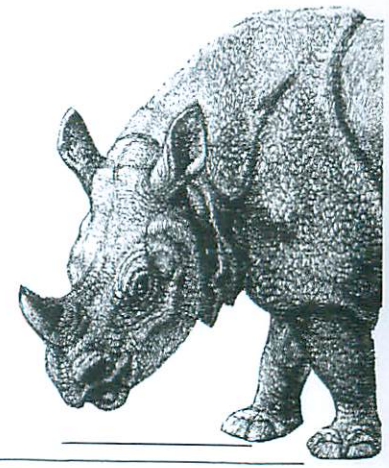
Milroy continued to work for wildlife until he died in September 1936. He worked to have both Manas and Kaziranga protected as National Parks. Current-day conservationists will easily sympathise with the pressures he had to contend with from 'higher ups' and his discomfort at having to deal with 'Imperial cost-benefit analyses'. Here is what he wrote in his own Progress Report, published posthumously in 1936-37:

... the preservation of wildlife should be so conducted that the cost involved is not out of proportion and that public opinion is not antagonised. (ibid, 1936).

Milroy knew something that most people of the day (or today for that matter) did not: the key to the rhino's survival was habitat protection. But due to lack of strong support from his own countrymen, he had to resort to ill-advised practices to protect Manas and Kaziranga. To keep poachers at bay he took the help of graziers and herdsmen, which is why from late 1935 controlled grazing of domestic buffaloes was allowed in Kaziranga. Cattle camps sprang up along the Brahmaputra inside the sanctuary. A short-term problem was partially solved, but the seeds of even more deadly conflict were inadvertently sown.

"The history of the Indian rhino is also the story of the changing vegetation and climate of this subcontinent. Rhino existed during the Mohenjo-Daro era about 5,000 years ago, in the plains of the Indus river in what is now West Pakistan."

— E.P. Gee, *The Wild Life of India*



E. P. Gee with elephants belonging to the forest department of Kaziranga and their *mahouts*. By closely monitoring elephants, he created a unique record over 13 years of the growth-gradient of these gentle giants.

In 1949, four years after the war ended, the Assam Government invited the Bombay Natural History Society to form a committee of environmentalists and naturalists to monitor Kaziranga and to consolidate and enhance its wildlife values.

We continue to live with the terrible damage caused to wildlife habitats by grazing not only in Kaziranga, but across the country. In the 1940s, rhinos in Kaziranga were forced to stray out of the Park because of the cattle. P.D. Stracey, author of the book *Elephant Gold* wrote in 1964 of department elephants being used to bring wandering rhinos back to safety.

It was tough to protect this vast area, with virtually no money allocated for staff salaries or mobility. Thus, though something in the vicinity of 38341.96 sq. km. of 'wasteland' was at the Government's disposal for Game Reserves, Milroy himself explained why nothing could be done about protecting this crucial area:

The principal (reasons) being the absence of staff and the impossibility of finding money to pay for one and the fact that most of this huge area is open to settlement and is bound either to be turned into cultivated fields in the not far distant future or else be so cut up by settlements that the larger animals in any rate will not be able to exist in the intervening patches without being a source of danger to human life and crops. (ibid, 1936).

British administration did not want to spend money on projects that did not earn revenue. The advent of tourism in Kaziranga probably arose from this need. Milroy suggested that the annual recurring costs for operations in Kaziranga were

small and were hoped to be recouped many times over, indirectly if not directly, by the expected influx of visitors. (ibid, 1936).

Miri moved from Kaziranga to Golaghat in 1937 and after a brief stint as acting Divisional Forest Officer at Jorhat, he died prematurely in July 1939.

In 1938, Kaziranga was opened to tourists. E.P. Gee was one of its first visitors and went around the Park on elephants. He wrote in the visitors' book,

Twice charged by rhino, and the elephants each time bolted for some distance.

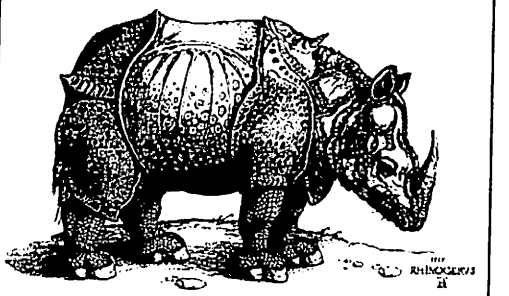
Gee continued to visit the Park for the next three decades and his book, *The Wild Life of India*, devotes two chapters to Kaziranga.

The future looked bright for Kaziranga, until the Second World War in 1939 when wildlife protection predictably took a back seat. Assam now served as the base for British operations in Burma and weapons and ammunition became freely available. Guns were turned on wildlife across India in the years that followed. Kaziranga was no exception. Even today the wreckage of a plane that crashed in the Central Range reminds us of those war-torn days.

SHAPING THE FUTURE

In 1947, P.D. Stracey took over as the Chief Conservator of Forests of Assam. By now reports of illegal shooting and fishing in the Park had become commonplace, some suggest with Forest Department complicity. Kaziranga owes much to this man who was also instrumental in launching the Wildlife Preservation Society of India. Stracey embarked on a vigorous clean-up operation. He appointed a new ranger, R.C. Das, earlier a schoolmaster, who chose to join the Forest Department. He and Stracey made a good team. Kaziranga proved that nature has a way of bouncing back when given even the smallest hand. With protection, swamp and hog deer populations in the Park soon rose, poaching came down and the number of visitors increased.

DÜRER'S RHINO



It was the fashion of the day to give extravagant gifts to powerful people, which is why Sultan Muzaffar II of Gujarat decided to obtain a live rhino and sent it through the good offices of Alfonso d' Albuquerque, Governor of Portuguese India, to King Manuel I in Lisbon.

Possibly unimpressed with the strange gift, the King shipped it to Pope Leo X in Rome, but, so the story goes, the ship sank and the rhino died. Nobody ever explained how, but it is claimed that the rhino was retrieved, stuffed and presented to His Holiness. This specimen served as a model for one of Germany's most-talented artists who did a pen and ink sketch, from which a wood-cut was made and hundreds of prints taken.

Dürer's rhino gained immense popularity as no one had even imagined that a creature such as this existed. Though it might look exaggerated to us today, if we consider that he drew this from a dead specimen that may not have been exactly well preserved, one must marvel at the end product. In words, Dürer described the living animal as the colour of a toad, the size of an elephant (with shorter legs) and with a horn, which he claimed the animal would sharpen like a knife on sharp stones.

Elephants have always been used to study and protect rhinos in Kaziranga. The visitors' book is replete with references to the skill of *mahouts* who rode legendary Department elephants such as Akbar, Mohan and Sher Khan, used to transport Prime Ministers, Presidents and foreign dignitaries.

This map is used for visual effect only. It is neither accurate, nor authenticated. Sources: Survey of India, Director, Kaziranga National Park

In 1947, P.D. Stracey took over as the Chief Conservator of Forests of Assam. This was a time when reports of illegal shooting and fishing were commonplace. Kaziranga owes much to this man who was also instrumental in launching the Wildlife Preservation Society of India.

In 1949, four years after the war ended, the Assam Government invited the Bombay Natural History Society (BNHS) to form a committee of environmentalists and naturalists to monitor Kaziranga and to consolidate and enhance its wildlife values. The committee was also entrusted with bringing the grandeur of Kaziranga to public notice. The committee included Dr. Sálim Ali, Dr. Dillon Ripley and C.G. Baron and their report was taken seriously. A key suggestion was the need to continue protecting the small population of rhinos. In 1950, Stracey asked that the term 'Game Sanctuary' be changed to 'Wildlife Sanctuary'. A new ethos was ushered in.

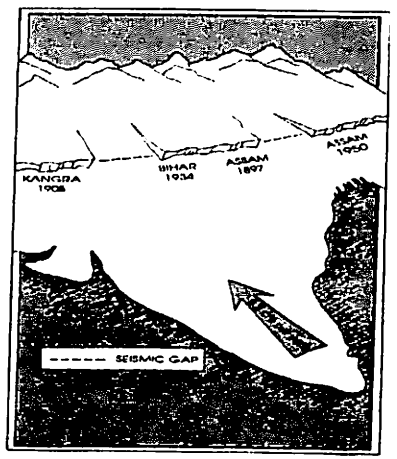
The *Assam National Park Act* was passed in 1968 and a notification of intent to declare Kaziranga as a National Park was issued a year later. In 1972, the *Wildlife (Protection) Act* was promulgated, further strengthening the hand of wildlife managers across the country. In 1974, the then Chief Conservator of Forests, P. Barua, helped get Kaziranga declared a National Park. J. Juan Spillet was probably the first to conduct an animal census in Kaziranga. Theoretically, the strictest imaginable protection was now available to the rhino. But it still needed a very dedicated and daring lot of park rangers to guarantee protection on the ground. Their names may not be well known outside the tightest of wildlife circles, but future generations should be grateful to the likes of Parmanand Lahan, C.L. Chakrabarty and R.M. Das who worked ceaselessly to safeguard the rhino's future, even as parks like Manas suffered huge reverses. Rajen Sonowal, B.S. Bonal, K.K. Medhi and S. Deb Roy also contributed to the protection of the Park and yet others including Kaziranga's current Director, N.K. Vasu, do so even today.

P. Lahan spent more than 10 years in Kaziranga and his knowledge of the Park and its wildlife and flora is still a benchmark for today's managers. He oversaw the establishment of permanent anti-poaching camps and plotted Kaziranga's patrolling paths. He and the late S. Deb Roy adopted Milroy's strategy of using fire to maintain the grasslands, refining the method to incorporate patch-wise as opposed to random burning, which was the order of the day in the early '70s. This worked to the advantage of herbivores whose numbers now rose dramatically. Grasslands now constitute 70 per cent of the total area of Assam's 16 Protected Areas.

When people go out and watch rhinos in Kaziranga today, they should spend a moment in silent contemplation to thank Kaziranga's Forest Rangers and their men. They have been involved in countless armed encounters with poachers. Individuals such as Srikanta Sarma, D.D. Boro, Bhupendra Nath Talukdar, Gunin Saikia and Pankaj Sharma have been directly responsible for Kaziranga's success during their tenure. It is the result of the individual sacrifices made over decades, that in 1985, UNESCO saw fit to list Kaziranga as a World Heritage Site, providing it with the international recognition it richly deserved.

Kaziranga asks humankind to stop and consider whether its collision course with nature is in its best interests. It asks us to look up at the boundless wonder of the sky, endless grasslands, resilient trees and living rivers and to marvel at the harmony of which we could choose to be a part. The defenders of Kaziranga did pause to contemplate their place in the universe and it is because they were able to find inner strength to shape the future of Kaziranga that we have an inheritance to protect.

"I have seen Kaziranga so many times when the strong, dry winds of February and March sweep the roaring man-lit fires through the elephant grass, leaving bare black patches of charred stalks. I have seen it often in April and May when the new freshly-growing grass attracts swamp deer and hog deer, now resplendent in their bright new summer coats. I have boated through it during the peak floods of the monsoon months, and have secured what is probably the only photograph of a rhino swimming in deep water. The time I like best of all, however, is the end of the monsoon, October and November, when the floods have receded and the rains with their heat and humidity give way to cool, sunny days. It is then that most of the many kinds of grasses and reeds burst into flower, and in the distance to the north can be clearly seen the snow-capped peaks of the Eastern Himalayas, over a hundred miles away."
E.P. Gee, *The Wild Life of India.*



Four great earthquakes ruptured the Himalayan plate over the past 100 years, when most of the conservation steps to protect Kaziranga were being taken.

Source: *Earthquake Hazard and Large Dams in the Himalaya.*

KAZIRANGA'S BIG FIVE

Rhino, elephant, buffalo, tiger and swamp deer

Kaziranga, with its diverse habitats ranging from floodplains and grasslands to evergreen forests, is ideal for herbivores and therefore carnivores. Most visitors, predictably, come to see the 'big five' – rhino, elephant, buffalo, tiger and swamp deer.

A thick mist cloaks the grasslands. Rhinos, wild buffalo, elephants and deer appear and disappear like apparitions on an ethereal stage. Kaziranga has the world's largest population of the great Indian one-horned rhinoceros *Rhinoceros unicornis*. It also harbours more wild buffalo *Bubalus bubalis* and swamp deer *Cervus duvauceli ranjitsinghi* than any other forest in the world. That is not all. It has the highest density of tigers *Panthera tigris* in India and a hugely significant population of the Asian elephant *Elephas maximus*.

THE RHINO *RHINOCEROS UNICORNIS* (*GORH* IN ASSAMESE)

Kaziranga supports approximately 1,600 great Indian one-horned rhinoceros and is considered the last stronghold of the species in the world.

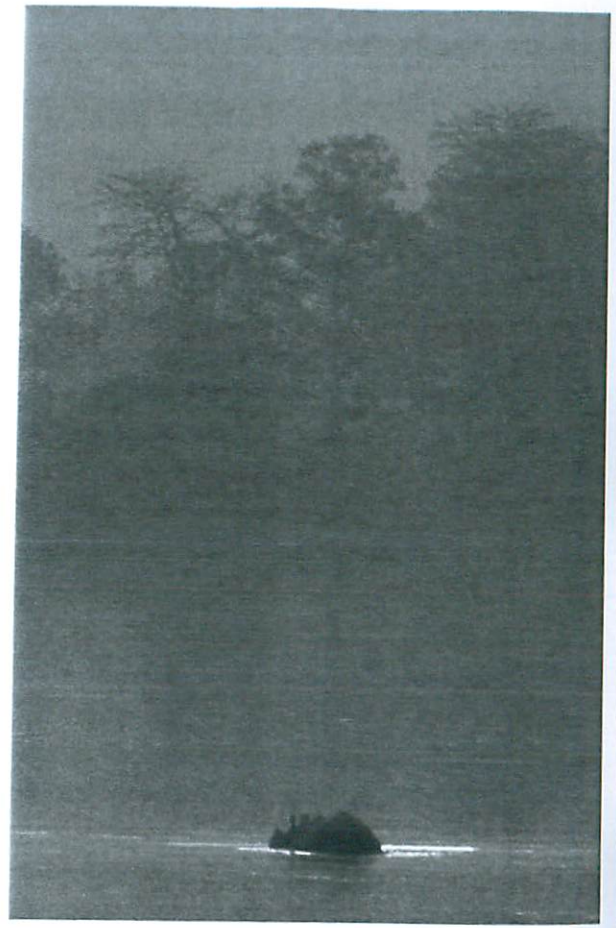
The first placental mammals appeared in the Paleocene (65-55 million years ago) but the most dramatic mammalian development occurred in the Eocene (55-33 million years ago). Ancestors of the *Rhinocerotidae* family probably first appeared in this period. Some suggest that the rhinoceros was once even common in North America and that it died out from there as late as the Pliocene (five to two million years ago) and even more recently from Eurasia, in the Pleistocene (just one million years ago).

There are five different species of rhinos alive in the world today. Experts trace the Indian one-horned rhino back to the Siwalik rhinoceros *Rhinoceros sivalensis* and *Rhinoceros paloeindicus*. These ancient species roamed India's first, large grass plains that emerged in the Pliocene. The Javan *Rhinoceros sondaicus* and Sumatran, or Asiatic two-horned *Dicerorhinos sumatrensis* were also found in parts of India towards the early part of the 20th century.

The Indian one-horned rhino was once distributed across the face of Northern India, from what is now Pakistan, through the Indian *terai* to the east, all the way to the Myanmar border. Apart from a few specimens that were translocated to the Dudhwa National Park over a decade ago, rhinos are to be seen in just nine isolated protected pockets in Nepal and Eastern India. Of these, roughly 60 per cent are found in Kaziranga.

The shifting course and bank erosion of the Brahmaputra river creates sandy islet tracts (*chaurs* and *chapories*) that are colonised by grasses. Grass is the rhino's primary food, which it supplements with *Trewia* fruit, tender leaves and woody browse. More than a metre wide, 180 cm. at the shoulder and weighing as much as two tonnes, the rhino consumes prodigious quantities of plant matter to support its bulk. But it is nevertheless a delicate feeder. The Indian rhino has a prehensile upper lip used to gather tall grass and shrubs. This lip folds inward when picking short grasses. It seems to prefer feeding early in the morning, or late in the afternoon. A favourite food is a short but nourishing grass Lokosa *Haemarthia compressa*, which grows in low-lying areas and the perennial ox-bow *beels*. Not surprisingly, the highest density of rhinos exists in the southwestern part of the park where short grass meadows are most extensive. Kaziranga's rhinos also feed on the longer grasses when they are tender. These include Ikora *Erianthus ravannae*, Nal *Arundo donax* and Khagori *Phragmites karka*.

The animal gets its name from the Greek words *rhis* – nose and *keros* – horn. The rhino's horn is not a true horn, but fibrous keratin (our fingernails are composed of this too). Once an evolutionary gift, the protrusion, measuring an average of 20 cm. (the longest ever measured was 52 cm.) has become a death sentence. This is because the horn, which can weigh as much as 720 gm., is worth its weight in gold. Traditional Chinese medicine practitioners are willing to pay huge sums to poachers for it (see page 134).



Elephants (previous page) have a tightly-knit family structure, with herds led by a matriarch, generally the most experienced female. Other members include younger females, sub-adult males and calves of varying ages. The young are extremely well-protected and generally flanked by adults. Elephants share their home with rhinos, which can attain great speeds, despite their bulk. Mate selection usually involves males running persistently behind females.

According to E.P. Gee who observed rhinos in zoos, both male and female rhinos must be in heat for a successful mating to take place. Fights and chases accompanied by verbalisation may take place over great distances during courtship.

A rhino's thick, greyish skin is divided into 'shields' by heavy folds that trap moisture and keep the animal cool. Tubercles, small, knobby protruberances, cover its flanks, shoulders and hindquarters, and together with the grey, plate-like folds of the skin, the animal does appear to be covered in armour. The skin is obviously very sensitive, however, as rhinos often coat themselves with mud, both to keep cool and to keep armies of biting insects at bay.

Though it cannot see too well, the rhino has an acute sense of hearing. And smell helps males find receptive females. When a rhino visits a community midden – the dung heaps so typical of the species – it sniffs the heap, possibly picking up 'messages' about other individuals in the area.

Despite its bulk, the rhino can attain speeds of 48 to 50 km. per hour, a fact that many humans discover to their dismay when scrambling to escape a charge.

The rhino is generally solitary, unless accompanied by a calf. It lives for approximately 45 years and the female may give birth to a young one at between six and eight years. A female may come into oestrus many times a year, when pheromones in her urine will stimulate males to respond. Courtship may involve tussles and noisy chases across several kilometres. A single calf, dark pink in colour, will be born after a 16-month gestation period. And a mother will protect her young one for a year or two, or until the next calf is born. Females with calves can be unpredictably aggressive.

Though the rhino has no natural predator, its calf is fair game for large predators such as tigers and leopards. This is probably why calves are born fully-developed and capable of walking less than an hour after birth. Calves seem to be in a constant state of hunger and will suckle approximately every half hour.

Some experts suggest that this is because of the low casein content in rhino milk. By the time they are eight or nine months old, calves will start to feed on grass, while continuing to take milk from their mothers. Mothers often ensure that their calves walk in front of them to prevent surprise attacks from the rear.

The rhino usually does not travel too far from its home range, unless forced to do so, for instance to escape floods. Females may occupy a large feeding range of between nine and 15 sq. km., males around six sq. km. Such ranges often overlap, and neighbouring males seem to tolerate each other, though males from distant territories may be forcefully challenged. During such skirmishes, the weapons of choice are the highly-developed lower incisors, or tushes, capable of inflicting serious wounds. There is no expert consensus on the evolutionary rationale for the horn. The horn is, however, not a weapon of choice for offence, or defence.

Males may be seen sparring on occasion and though some will share the same mud wallow they do not associate socially with each other. Like elephants, rhinos enjoy wallowing in mud and water.

A creature of habit, the rhino usually follows well-frequented walking tracks or *dandis* from its wallows to favoured feeding grounds. When such *dandis* pass through tall grasslands, the animal's body creates a sort of tunnel that it and other animals may use for extended periods. Poachers are well aware of such behaviour and take advantage of it by digging pit traps (see page 33) along *dandis*. To counter this, Kaziranga's forest guards patrol such 'tunnels' and paths meticulously

Bull elephants (above) live largely solitary lives but may join family groups for short periods when females are receptive. Elephants communicate with each other in a variety of ways from loud trumpets, to tummy rumbles and subsonic calls. After successful mating, (facing page) rhino females will carry their young for a gestation period of 16 months and calves will stay under the protective care of their mothers for between one and two years.

Kaziranga's pachyderms spend considerable time at waterbodies, providing us with exquisite insights into the most carefree and happy moments of elephant life.

on elephant back and on foot. To a significant degree this has kept the rhino out of harm's way in Kaziranga.

THE ASIAN ELEPHANT *ELEPHAS MAXIMUS (HATHI* IN ASSAMESE)

Kaziranga supports over 1,000 Asian elephants, making this one of India's most vital breeding populations.

The *Proboscidea*, which includes the elephants of today, probably originated from a pig-sized mammal 65 to 55 million years ago during the Paleocene, around five million years after the great dinosaurs died out. Only two species of elephants now survive – the African *Loxodonta africana* and the Asian. Together with the mammoths that went extinct around 5,000 years ago, both species originated in Africa. It was probably their ability to adjust to varying habitat and climatic conditions that ensured their survival, even as other species of elephants died out.

Through the ages, the elephant has suffered terribly at the hands of humans, who have killed them for their ivory and also captured and domesticated them, killing many herd members and tearing asunder closely-knit family groups. The famous P. D. Stracey wrote feelingly in his book *Elephant Gold* that:

> *In Assam especially, the land of the sage Palakapya who wandered with the wild elephants until he became one of them himself, perhaps it is not too much to hope that her people and their leaders will repay the debt of thousands of years of the trade in 'elephant gold', which has been wrung from this noble animal.*

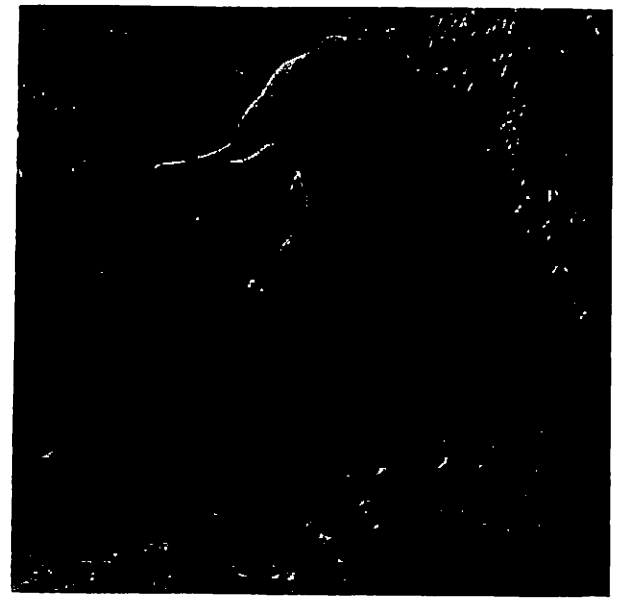
Asian elephants are still found in 13 countries in South and Southeast Asia. Extremely adaptable, they have colonised forested areas as well as grasslands with only patchy forest cover. On an average, they weigh 3,000 kg. and are around two-and-a-half metres at the shoulder. Social animals, they live in herds composed of individuals of varying age groups, ranging from young calves to ancient individuals. Herds are led by a matriarch. Males are usually solitary, but may also be found in the company of a younger male. Early mornings and late afternoons are the preferred times for them to feed in the open. When the sun is high, they choose forested parts of their range where they will continue feeding on branches, leaves, barks and fruits whose seeds will be dispersed near and far. As with elephants everywhere, Kaziranga's pachyderms spend considerable time at waterbodies, providing us with exquisite insights into the most carefree and happy moments of elephant life. Quiet observers will hear a variety of sounds that elephants use to communicate, from tummy rumbles and loud trumpets to low growls and subsonic calls that travel long distances.

Kaziranga has some of the country's most skilled elephant handlers, called *mahouts*. Visitors are transported each day atop 40 departmental elephants for a really close-up wildlife experience. Rhinos, in particular, allow elephants to approach much closer than they do vehicles.

Kaziranga's wild elephant population is not static. Herds move along traditional migratory routes over long distances, but in recent years these paths have been disrupted by human settlements. Some herds cross the Brahmaputra river to reach the northern Panpur Reserved Forest and Khatonibari.

Along the southern border of the Park, National Highway 37 disrupts access to the highlands of the Karbi Anglong Hills, where elephants have always gone in search of food and to escape the annual flood when low-lying grasslands are submerged.

The Karbi plateau runs contiguous to the Diyung river along the North Cachar Hills, Nambor forests and the base of the Khasi Hills.



Blue skies, white egrets and peaceable elephants (facing page), another typical day in the life of Kaziranga. The breeding success of animals like elephants has everything to do with tranquillity. When humans disturb their peace, populations dwindle and conflicts result. Fortunately, the Kaziranga authorities get the political support they need and this has enabled them to retaliate in kind when armed poachers invade their territory. Such lethal encounters seem to have convinced all but the most determined criminals to keep their distance from the Park. This is why Kaziranga can be celebrated as a conservation success today.

Protecting the Kaziranga inheritance

100 years from today, will Indians write as glowingly of us as we have of the likes of Stracey, Milroy, Gee and Lahan? *Bittu Sahgal* and *Ranjit Barthakur* outline a strategy to safeguard Kaziranga's future for generations unborn.

In the preceding pages we explored Kaziranga's hidden havens and sampled the piercing beauty that led this beautiful Park to lift itself from the status of a mere 'wildlife destination' into an inheritance demanding our collective protection.

But protecting paradise is easier said than done in an age when money is the *mantra* to which the vast majority on our planet dance. Rhino horn, tiger bones, elephant ivory and timber are, for instance, all exchangeable for cash. The international poaching gangs that strip-mine the biodiversity of the earth from pole to pole know this and they are camped around this, the last stronghold of the Indian one-horned rhino.

Kaziranga's patchwork of habitats offers infiltrators an infinite choice of land and water entry points. This is what makes it easy to break into and difficult to defend. And, while the six land additions to the Park will eventually strengthen the long-term security of Kaziranga, in the short run these areas are not yet free of human intrusion and thus act as windows of vulnerability – chinks in an otherwise strong armour.

THE GREEN ARMOUR

Kaziranga's chequered history is replete with stories of heroism and gallantry. We owe a debt of gratitude to the many individuals who protected the Park and its wards, often at the cost of their lives. It is not a new story. Boloram Dutta, a guard, was killed in a shoot-out with poachers in 1968; Pradip Prahdan, a game watcher, was killed by a tiger in 1972 and Motiram Baruah, a guard, died at the hands of poachers in 1985. Tragically, the list is much longer. And these are not the only risks. Deben Sacha drowned in the swollen Diphlu river while on duty in 1998. And the death toll keeps rising. Abdul Rashid, Lohi Ram Saikia, Niren Saikia, Digen Malakar, Birusan Mili, Pradip Dutta, Biru Charan Mili and Gopal Bori all lost their lives defending Kaziranga. The contribution of forest staff to India is at par with that of India's armed forces, but their families are not adequately compensated, nor do they receive the gratitude and honour that is their due.

Clearly, protecting Kaziranga is a very hazardous job. This mission continues to unfurl as the green baton is taken up by the youth of Assam, in whose hearts the love of nature was inscribed through ancient customs and mores inspired by the spirit of the wilderness.

We have seen in earlier chapters how the rhino was brought back from the brink of extinction. And we have met some of the stalwarts responsible for this happy circumstance, though no book can hope to do full justice to, or even adequately list all the hidden heroes who laid the foundation for the success of Kaziranga, or the future of the Indian one-horned rhino.

Kaziranga, like most Indian parks, faces innumerable threats. These include illegal grazing, floods and erosion aggravated by human landscape intervention, invasion by exotic weeds, over-siltation, retaliatory killings when animals harm humans or their property, roadkills on National Highway 37 and unsustainable tourism pressures. While the boundaries of the Park are legally defined, such demarcations are not always obvious on the ground and in any event do not constrain wild animals. Predictably, therefore, Kaziranga's protectors are finding it exceedingly difficult to keep the peace between man and animal. They need greater resources, more political and public support. An overview of the most pressing problems that beset the Park provides a glimpse into the enormity of the task of consolidating and preserving the Kaziranga inheritance.

DUDHWA'S RHINOS

In what was hailed as one of Asia's most significant conservation initiatives, five rhinos from Assam were translocated to their former range in the Dudhwa National Park in Uttar Pradesh on April 1, 1984.

The fear of rampant poaching in Assam triggered the quest to find a safer, alternative home for the animals. In August 1979, the Asian Rhino Specialist Group of the IUCN Service Commission (Species Survival Commission) met to work out strategies for the long-term survival of the three Asian rhinos. For the Indian one-horned rhino, they suggested identifying new areas to hold additional population units and to translocate them from overpopulated areas. In November 1979, the Wildlife Status Evaluation Committee of the Indian Board for Wildlife appointed a rhino sub-committee to recommend alternative sites for the translocation. Dudhwa offered a combination of grasslands, wooded forests, shelter and shallow wetlands to wallow and forage.

Five rhinos (two males, three females) were captured between March 15 and 21, 1984 from the Pobitara Sanctuary and an area surrounding the Nowgong Forest Division, about 60 km. from Guwahati. The rhinos were transported on a specially-chartered Aeroflot cargo aircraft from Guwahati to Delhi and then travelled by five separate trucks to Dudhwa. In 1985, four more rhinos were translocated from Nepal. In 1987, one of the females gave birth to a calf, but it died. The rhinos are still within a fenced area of about 30 sq. km. in the Kakraha range of Dudhwa. Once the population stabilises, the fences are to be removed. The original group of seven has grown to 17 and some conservationists feel that the fences should now go. The Dudhwa authorities argue that this would expose them to danger from poaching and straying towards areas where intensive patrolling is not possible.

The sun sets on another day in the life of the forest guards. The forest guards of Kaziranga (previous page) belong to one of the most fearless brigade of wildlife protectors in India. Foot patrols are an arduous and dangerous necessity and long hours of patrolling difficult terrain with a heavy rifle in tow can lead to spinal injuries.

keratin fibres, the constituent of our own hair and nails. It is loosely fixed to the epidermis and not attached to the skull. Though the horn can easily be removed, poachers still hack through the bone. The great Indian one-horned rhinoceros gets its name *Unicornis* because of this single horn, which keeps growing throughout its life. On an average, a horn will be around 20 cm. long and will weigh around 720 gm. Porous, spongy and pockmarked, the horn is not used either as a weapon or to dig. It could have some display value for mate selection, but males and females have virtually indistinguishable horns save for a somewhat wider base in males. The human obsession with rhinoceros horn has become a death warrant. The horn has been used in traditional Chinese medicine and is falsely reputed to have aphrodisiacal qualities. People also believe it reduces high fever, food poisoning, headaches and numerous other ailments for which the most common medicines would be much better suited. In ancient days, royals drank from cups crafted from rhino horn that they thought could detect poisons. Pregnant women were convinced that a rhino horn placed under the bed ensured an easy and less painful delivery. Many still fall prey to such beliefs, much to the detriment of the rhinos of the world. Although international trade involving rhino horn has been banned, it is still in demand by criminal dealers. Wildlife products probably constitute the third largest illegal trade in the world after drugs and arms.

Several writers on animals have described the Indian rhino as only uttering one noise, a grunt! I have heard four different noises; a roar or a bellow when newly captured, a snort when excited or disturbed, a grunt when not disturbed and a peculiar whistling sound at the time of courting and mating. **– E.P. Gee,** ***The Wild Life of India***

The rhino's horn can easily be removed from a dead rhino, as this forest guard was instructed to do when one of Kaziranga's rhinos died a natural death. The horn must be removed to prevent its theft and its ultimate journey into the hands of international poaching syndicates that freely trade in drugs, arms and wildlife contraband including ivory, tiger skins and bones and *shahtoosh* shawls for which Tibetan antelopes are slaughtered.

Kaziranga is acknowledged to be the best protected National Park in India. This is a tribute to dedicated forest officers and wildlife protectors, past and present.

GRASSROOTS CONSERVATION

The silt-enriched floodplains of the Brahmaputra encourage grasses to be established even on loose, or eroded sandy patches. Across the globe this is recognised as the first stage of vegetative recovery, or 'succession' on land. Under favourable circumstances, soil will accumulate behind grasses and this in turn offers protection to seeds carried by wind, water or the droppings of birds and animals. Over vast periods of time, plants of all descriptions take root in the area, and such plants in turn provide food and shelter to animals, resulting in the spectacular diversity of life forms on display today.

Almost all experts accept that the ability to preserve the health and vigour of Kaziranga's grasslands will determine the life or death of Kaziranga and its rhinos 100 years from today. This is well stated in the Kaziranga Management Plan:

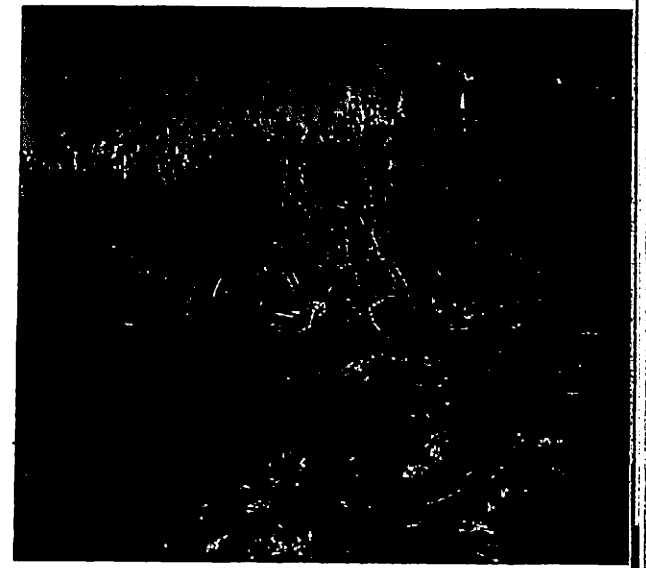
> *The entire Kaziranga area was formed by the alluvial deposit of the Brahmaputra river and its smaller tributaries, which carry a great amount of silt during the rainy season every year. The riverine areas thus formed are colonised by* Saccharum *and other pioneer grass species as soon as the land masses are stabilised. But before the succession of other pioneering tree species can start, probably such land masses again get eroded away. This type of land formation and vegetational succession can be observed even now in the* chapories *formed along the course of the Brahmaputra river.*

The battle for dominance between grasslands and trees is as ancient as the evolution of grass itself and fire has always played a central role in this drama. Kaziranga's authorities have been mandated to manipulate the Park to the advantage of rhinos. One strategy involves selective burning of the grasslands, which in turn promotes new succulent grasses preferred by rhinos (and elephants, buffalo and other herbivores). Burning also prevents trees from taking over the grasslands. B.N. Talukdar, an Assistant Conservator of Forests and a former Ranger, who spent over a decade managing Kaziranga's grasslands has documented this habitat management strategy and the rationale for burning in an unpublished work titled: *The Grassland Heritage of Assam* that throws light on the grassland ecosystems of the floodplains of the Brahmaputra river and its tributaries.

Burning moist grasslands as a habitat management tool was initiated by A.J.W. Milroy and later institutionalised by P. Lahan and the late S. Deb Roy. Recognising the downside of burning, Lahan introduced patch-wise burning, once a year, at carefully-chosen intervals. His strategy stood the test of time. Trees and weeds were effectively kept at bay, while in the unburnt sections lesser life forms that are the foundation of Kaziranga's biodiversity were given a chance to thrive. Talukdar explains that:

> *Waterbodies, areas of short palatable grass and taller grasses for cover make Kaziranga an ideal habitat for the rhino. The rhino prefers the grasses growing in and around the numerous* beels. *The mix of grasslands and evergreen forests also makes Kaziranga an ideal habitat for other herbivores including elephants, swamp deer, hog deer, Asiatic wild buffalo and sambar.*

There was opposition to burning when it was first started. But it soon became clear that without such manipulation, rhino and large herbivore densities would be difficult to sustain. And then the figures began to speak for themselves. In the past three decades, the rhino population has risen from just over 350 to 1,600; wild buffalo from around 470 to 1,400; and the Asian elephant from 350 to over 1,000.



A guard checks a rhino midden (top), and B.S. Bonal, Director of Kaziranga (1996-2000) and Forest Ranger D.D. Boro, to his right, inspect a field outpost. Kaziranga's success is largely a result of pre-planned patrolling by dedicated field staff who place the welfare of wildlife before their own.

Almost all experts accept that the ability to preserve the health and vigour of Kaziranga's grasslands will determine the life or death of its rhinos 100 years from today. Careful scientific monitoring is, however, essential to reduce collateral damage to other biodiversity.

Wireless sets (above) are vital not just to protect wildlife, but also as self defence for forest guards who must call for quick reinforcements when encounters with armed poachers become inevitable. This image taken by E.P. Gee decades ago (facing page), shows the keepers of Kaziranga lighting a controlled fire, a strategy that helps maintain grasslands and benefits rhinos.

Talukdar readily concedes, however, that burning has harmful side-effects. Slow-moving animals including reptiles, ground nesting birds, soil micro-flora and many burrowing animals succumb to the annual fires. Elsewhere, in Manas, species such as the pygmy hog, hispid hare and the Bengal Florican have been adversely affected by burning.

In Kaziranga, however, the pros seem to have outweighed the cons of grass burning. Among other things, this helped counter grazing pressures and thinned old grassy patches that would otherwise have become difficult to negotiate, even for large animals such as rhinos, elephants and wild buffalo.

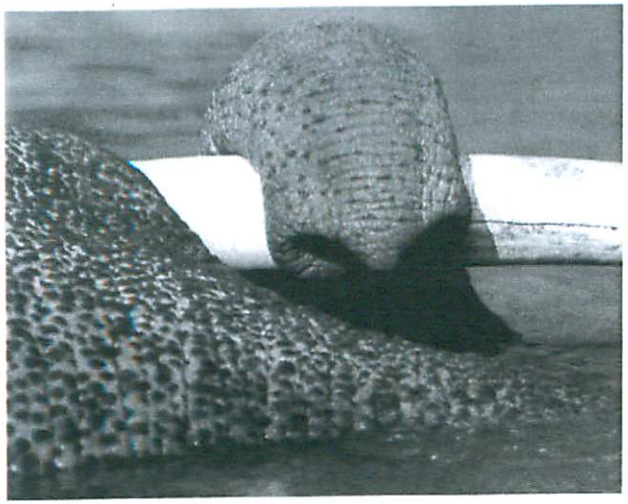
The tall and coarse grasses dry up in winter and January is roughly the ideal month for burning, but the exact timing should be left to the judgement of experienced park managers. Soon after the burn, animals congregate in large numbers on the ash-fertilised new growth and on the partly-burnt stems. The first monsoon showers herald tender shoots, rich in protein. In the burnt patches, grass reappears with vigour to the advantage of the rhino.

Kaziranga's grasslands are the backbone of its conservation success. Despite criticism and debate on the burn strategy, it has stood the large herbivores of the Park in good stead. But with increased herbivore populations, over-grazing is a major worry. Hard decisions must therefore be taken to enlarge the physical boundaries of Kaziranga to improve habitat continuity and thus consolidate past successes.

Competition from domestic animals is a serious threat to the herbivores of Kaziranga. Despite efforts to keep them out, cattle enter the Protected Area from villages located cheek-by-jowl with the Park. The rhino prefers to feed on short grasses and overgrazing causes the ground to harden, thus crowding out favoured grasses. In time, weeds dominate less aggressive indigenous vegetation to the extent that even controlled burning by the Forest Department becomes ineffective. Gradually, the habitat becomes less suitable for the rhinos. Added to this is the fear of epidemics that could be spread by domestic livestock. In theory, this is easily countered by innoculating cattle but the government has few resources to do this. NGOs have been approaching donor agencies to help take up the task, but there has to be more concerted effort to address this issue.

DEFENDING THE RHINO

Trophy hunting was replaced by poaching when official hunts were banned in 1908. Organised poaching gangs have been active for decades, but became more organised in the late 1980s in response to the rising price of horn and ivory in the international market. The lack of adequate manpower to protect the porous southern boundary has been a vulnerability that continues to haunt Kaziranga's protectors. To the north, the Brahmaputra river acts as a less accessible natural boundary though fishermen have always been induced to lend their boats to poachers for access to protected wildlife areas. Their target is largely rhino horn and at one time the principle tools were a gun and a sharp hacking knife to cut the horn free. The oldest and still a very deadly method of killing rhinos involves digging a pit across a known path, or *dandi*, crafted by rhinos as they move between favoured feeding and wallowing grounds. This trap strategy was once used officially to capture rhinos (see page 33). Poachers place sharp spear-like stakes at the bottom of the pit,



The battle for dominance of grasslands by trees is as ancient as the evolution of grass itself and fire has always played a central role in this drama. A.J.W. Milroy used fire successfully to regenerate *sal* trees and established the legacy of grassland burning. Departmental elephants (top) have always been key to wildlife protection and management, not only in Kaziranga, but across India.

Burning moist grasslands as a habitat management tool was initiated by A.J.W Milroy and later institutionalised by P. Lahan and the late S. Deb Roy.

making this a terrible weapon of choice because it allows perpetrators to dig, hack and then melt away even before their dark deed is discovered. All too often the hapless animal breaks its spine and dies a long and painful death, suffocating under its own massive weight.

Counter-measures involve elephant-back patrols, supplemented by foot patrols (particularly during full moon nights when poachers are most active), along known rhino paths. Scores of pits have been found and covered up. High-tension electric wires are used to electrocute wildlife across India. Here in Kaziranga, this is not currently a major threat, but with electricity being brought to new areas every day it is always going to be a worry. Besides, electrocution kills guards on foot patrol just as easily as wildlife.

Ivory, skins and tiger bones are also attractive to poachers. But rhino horn remains Kaziranga's most-favoured contraband (see box on page 134). Despite very porous borders, inadequate resources and manpower, Kaziranga is acknowledged to be the best-protected National Park in India. This is a tribute to dedicated forest officers and wildlife protectors past and present.

Pankaj Sharma, who served as a Forest Ranger in Kaziranga in the '90s, explains that in Kaziranga a network of over 130 strategically-located anti-poaching camps have been established, which, coupled with a regimented system of foot patrols, effectively reduce rhino poaching incidents. He and his colleagues were involved in several armed encounters that have had the effect of dissuading all but the most determined poachers. Villagers know that being caught inside the Park is life threatening. This makes it difficult for poachers to recruit locals, and keeps illegal grazing, grass collection and fishing in check. This deterrence has greatly added to Kaziranga's security and has been made possible thanks to the daily contribution of the anonymous foot soldiers of Kaziranga. Additionally, intelligence-gathering helps keep track of known offenders, though the occasional rhino still falls victim to poachers.

The rhino's recovery is undoubtedly the most visible sign of Kaziranga's conservation success. But the future still remains uncertain. A key fear is that a disease like anthrax might take a toll of the virtually islanded population. Also that even a momentary break in the protective shield (as took place during the Second World War) could give poachers the chance they are waiting for. There is talk of translocating rhinos to other habitats such as Manas, Dibru Saikhowa and Orang. This initiative needs careful scientific study and execution and the recipient habitats would need to be nurtured prior to any such release to ensure both food availability and protection from poachers.

PROTECTING THE PROTECTORS

Kaziranga is divided into four ranges and each range is manned by a trained forest ranger, deputy rangers, foresters, forest guards, plus a number of casual workers. In addition to these protectors are scores of boatmen, elephant *mahouts*, drivers and the veterinary staff of Kaziranga. This field team is primarily under the supervision of the Divisional Forest Officer, who is supported by two Assistant Conservators of Forests. The Director of the Kaziranga National Park is the head of this tight and highly-motivated team.

The team's nerve centre is Bokakhat at the southeast edge of the Park. The staff uses a combination of elephants, boats, four-wheel drive vehicles and bicycles to patrol their extremely-threatened turf. But the backbone of their defence is the foot patrol. Waking at five in

Attempts are now being made to restore wildlife corridors, both north and south of the Brahmaputra river, so that elephants, rhinos, buffalo and deer are provided with an escape route from the devastating floods that take a major toll of their lives each year.

the morning, armed guards walk continuously through swamps, grasslands and forests, stopping only to grab a hurried, dry meal. The risk of being ambushed on such patrols, which end long after dark is ever-present. These are the unsung green warriors whose contribution has thus far been under appreciated. But fortunately this is changing rapidly.

Aware of the financial constraints under which the forest staff must work, many foundations, Non-Governmental Organisations (NGOs) and private corporations have stepped into the breach to donate wireless sets, boats, vehicles, medicines, torches, shoes and uniforms for the field staff. But the question must be asked: should such basic equipment not be made available by the government directly?

Of course, the wildlife trade and timber mafias that operate with impunity need endure no such tribulations. Their key operatives are often armed with Geographical Positioning System (GPS) equipment, satellite phones, automatic weapons, quick transportation and slush funds. The only possible way to effectively counter such forces is to enhance the capacity of the defenders. They ask for little more than better mobility, communication and weapons. And that their families are financially secure and treated at par with the armed forces and the police. The living conditions of our frontline warriors need to be drastically improved. They are all that stands between survival and annihilation for Kaziranga today.

A FLOOD OF CONCERN

Lahan, Deb Roy and other experts have repeatedly gone on record to emphasise that floods regenerate and recycle nutrients vital to Kaziranga's ecosystem. Flood waters replenish channels, shallows and *beels* with rich deposits of alluvial soil and wash away some of the water hyacinth that choke Kaziranga's wetlands. Evenly-distributed rain seldom causes serious damage, nevertheless, wild animals can be seriously impacted if the rain falls in too short a period. In this season, fodder grasses also become scarce and herbivores resort to eating coarser, less preferred grasses and water hyacinth.

When the monsoon sets in, floodwaters enter the Park from the northern boundary and through the Moridiphlu and Mori Dhansiri rivers. The water quickly overtakes the low-lying southern portions of Kaziranga, including Baguri. In 1998 alone, approximately 600 animals drowned. Most of these deaths could have been avoided had the animals' normal escape route to the highlands not been usurped by humans. The Park authorities are forced to patrol the highway day and night in this season because the animals are forced to leave their protective confines to seek refuge on exposed and unprotected tar roads and embankments.

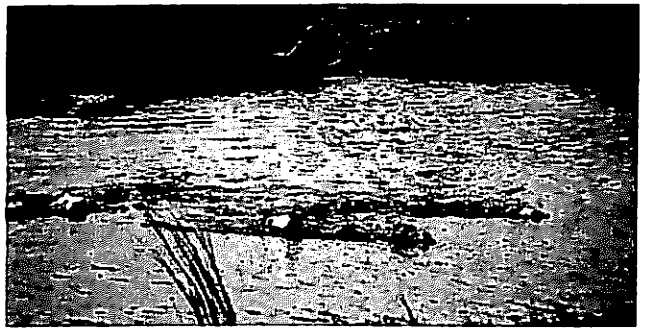
Attempts are now being made to restore wildlife corridors, both north and south of the Brahmaputra river, so that elephants, rhinos, buffalo and deer are provided with an escape route from the devastating floods that take a major toll of their lives each year. The Park boundary touches the Karbi Anglong Hills at Haldhibari, which, together with the Panbari and Kanchanjhuri Reserved Forests, offer a slender escape route to high grounds. While legal and public opinion battles continue to be waged to ensure such safe passage, a more ambitious plan has been mooted to shift the alignment of National Highway 37, away from the southern boundary of Kaziranga, north of the Brahmaputra.

Even before humans laid claim to the high ground, wild animals must have suffered some losses with each monsoon. This pales into insignificance with the trauma inflicted by National Highway 37

"There are about 85 working-elephants that constitute 'the staff'of the Wildlife Division of the State's Forest Department... Like all government employees they retire and are entitled to pension. Rs. 1,100 per elephant, per month was budgeted for their upkeep way back in 1989. These working-elephants are posted in the fragmented wildlife sanctuaries and national parks of the state. Their role in patrolling and anti-poaching operations can never be substituted in the grassland/wetland habitat of the one-horned rhino."

A.K. Baruah, in a letter to the Chief Secretary of Assam in 1998

Guards patrol Kaziranga on elephant back (facing page, bottom right) and vehicles (above). Without departmental elephants, protecting Kaziranga would be well nigh impossible. Foot patrols and fire-control duties (facing page, centre) deep in rhino country place the staff at risk of ambush from poachers, and from unpredictable encounters with rhinos, elephants and tigers.



Cows swimming (top left) in one of the many *beels*. Illegal grazing along the periphery of the Park not only alters the natural habitat of the rhino, but adds to the constant fear of epidemics such as anthrax. A truck loaded with logs (top right) en route to a timber yard, highlights the problem of deforestation in Northeast India... a prime reason for the increased frequency and intensity of floods.

and its associated developments today. The ugly 'ribbon development' along this highway is plain to see. It has eaten into natural habitats. What is more, scores of large and small animals also die in road kills and this toll will only rise if plans to turn it from a two to four-lane highway go through.

Continuous deforestation has greatly exaggerated the impact of floods in the Brahmaputra valley, but even this could get worse if a series of ill-advised hydroelectric projects planned for northeastern India are actually built. Unregulated releases from such reservoirs, which are being sited in some of the most earthquake-prone zones in the world, would not merely threaten wildlife, but the agricultural and fisheries base and thus the self-sufficiency of the Assamese people whose fate would no longer be in their own hands.

AN EXOTIC PROBLEM

If their preferred plant foods are displaced by less palatable weeds, the future of Kaziranga's large herbivores will be bleak. This is why the management of the Park wants more resources for cutting-edge research on the ecology of the Park and the cause and effect of the invasion of plants such as *Mimosa* and water hyacinth..

Strategies such as uprooting and weeding before new seeds establish themselves have had only limited success. The proliferation of invaders such as *Mikenia, Mimosa* and *Eichhornia* could overwhelm less hardy species

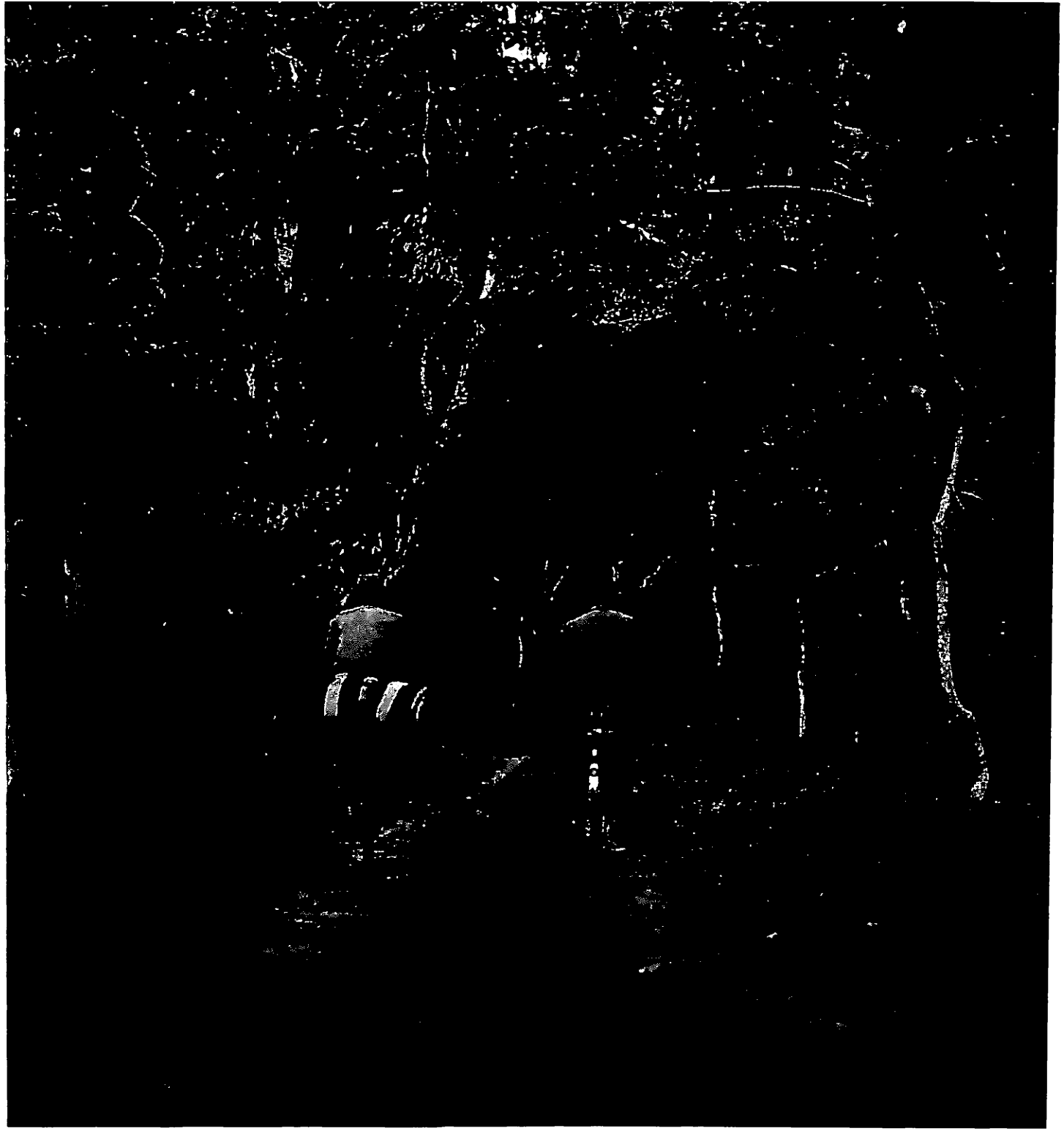
Even to the untrained eye, *Mimosa*, a straggling herb, can be seen to be edging out Kaziranga's nutritious tall grasses. Two *Mimosa* species are spreading fast and rise higher than elephant grasses, laying thorny obstacles that even large animals cannot negotiate easily. *Mimosa* was actually introduced by planters to rehabilitate over-used soils and curb unwanted grasses in tea estates. As with most exotics, the solution soon turned into a problem for Kaziranga's habitat and its wildlife.

Hyacinth is another long-standing problem that had been recognised by E.P. Gee almost half a century ago:

> *I remember what it looked like before all the streams and* beels *were invaded by that beautiful but terrible pest the water hyacinth. This was introduced into India from South America about 50 years ago as an ornamental plant. One tiny bit of it can spread over an area of 600 square yards in a few months, and it does incalculable damage. At first no animal in Kaziranga would touch it, except wild pig, which grub up the roots in the dry weather. Nowadays elephants, rhino and buffalo sometimes eat a little of it, apparently with reluctance.*

Large masses of water hyacinth continue to be moved about the Park by flood waters. The plants are trapped behind raised roads, bridges and narrow culverts. Animals can drown in particularly thick patches.

No permanent solutions have emerged. However, efforts are being made to to curb grazing along the edges of the Park and restore health to its planned extensions. Future plans also seek to enhance the ecological continuity between lowlands and highlands. Such steps will solve problems that have so thus far eluded us.



GREATER KAZIRANGA

Kaziranga is a high-profile Protected Area that has profitted from human care since the turn of the 20th century. This meant no hunting (though poaching was always a problem) and no agriculture. Nature responded positively – rhino populations rose, as did those of other wild animals. The fact that 518 bird species have been listed from Kaziranga underscores the success of the conservation strategies, particularly when you consider that the diversity of birds means a diversity of avian foods, both plant and animal. Systematic scientific research will surely reveal that a treasure trove of 'invisible' biodiversity has benefitted from the protection designed for the rhino.

At this juncture, we need comprehensive studies to monitor the key indicators of the ecological health of Kaziranga. This means more than just mega-fauna. We know all too little about the health and diversity of soil micro-organisms. Or how aquatic plants and animals are coping with the greater frequency and intensity of floods. Or the state of canopy-living creatures. It is particularly crucial that we understand the impact of chlorinated compounds released from tea estates and refineries in Numaligarh that drain into the Park. These might already have damaged the endocrine systems of rhinos, tigers, elephants, rodents and birds. How is the bio-accumulation of toxic chemicals affecting the breeding biology and immune systems of species in Kaziranga?

The problems of the Park – which extend way beyond the relatively sketchy outlines presented in this volume – have been identified by the authorities, who have their job cut out for them. As of now, they must grapple with the management of grasslands,

An overriding concern affects the future of Kaziranga, and all of India's wildernesses – will the flash, glitter and endless demands for 'development' allow places like Kaziranga to survive for another century and beyond?

forests and wetlands. Anti-poaching, flood control and the restoration of migratory corridors and tackling rising human-animal conflicts is a full-time job too. But where are the resources?

The key to Kaziranga's future lies in how effectively conservation objectives will be met in the next decade. Also on the downstream impacts of large-scale developments planned for Northeast India, including high dams.

Will Kaziranga survive for another century and beyond? Can we find the will to protect this slice of paradise, as the original defenders of Kaziranga's rhinos were able to? The answer to both questions is 'yes'; if planners accept the concept of Assam and the Northeast becoming 'nature states' with economics based on the enhancement, rather than the depletion of biodiversity.

The bottom line is that Kaziranga cannot survive in isolation, which will be its fate if a slew of man-engineered obstructions including canals, six-lane highways, rail lines and commercial plantations girdle the Park. To loosen the noose around the rhino's abode, we will need public consensus and political and financial support. The first task would be to provide seamless access to wild animals between the low-lying floodplains and the Karbi Anglong Hills. For this to happen National Highway 37 would need to be aligned so as to take the road north of Brahmaputra at Jorhat, and bring it back after skirting the 6th Addition, to the south bank, east of Numaligarh, between Bhalukhmara and Jorhat. This would, in one fell swoop, solve one of Kaziranga's most serious problems by securing the 'Greater Kaziranga' landscape. Additional resources and policies based on enhancing Assam's 'nature capital' would deliver a better standard of life to people living in the immediate vicinity of the Park, who would need to become prime beneficiaries of conservation through wildlife tourism policies in synch with India's National Wildlife Action Plan.

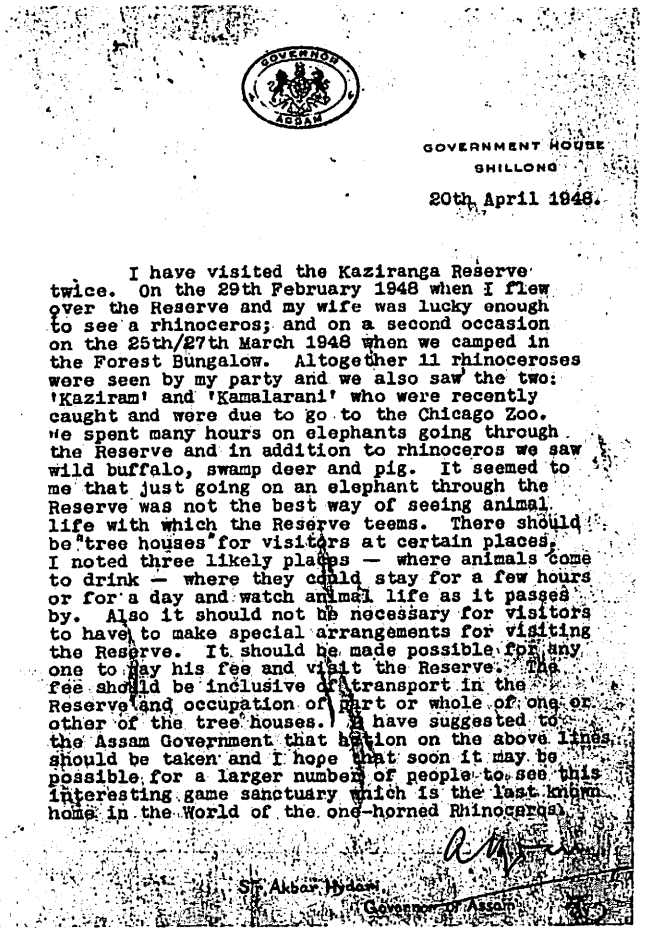
'Greater Kaziranga' consultations are unfolding at the level of planners, administrators, wildlife managers and community representatives. It is an ambitious idea that would see forest staff paid wages they deserve and be provided with the resources they need.

It goes without saying that the six additions to Kaziranga will need to be very carefully nurtured over the next decade, to return them to a measure of the ecological health that Kaziranga's core areas now enjoy. In the 'Greater Kaziranga' Landscape, several tea estates that are already suffering financial decline, would profit from heritage and nature tourism incomes, returning a vast percentage of their lands to the forest birds, hoolock gibbons, leopards, elephants and tigers that would draw visitors from far and near. Cattle populations would be stall-fed, innoculated against disease and would add to the economy of villagers. Researchers would study and document this process and help park managers take informed decisions.

In an era of bloody *shikar*, when the stalwarts of yesteryear planned to protect Kaziranga, their plans must have seemed even more difficult to implement than the 'Greater Kaziranga' dream we have today. But if we are able to rouse the necessary public, political and financial support, we might just succeed. And then, 100 years from today, Indians will write as glowingly of us as we have of the likes of Stracey, Milroy, Gee and Lahan. And our children would remember us well.

Guards patrol their turf on bicycles (facing page) and Bhupen Talukdar, then a Kaziranga Ranger, briefs his men at one of over 120 anti-poaching field camps. In the most adverse circumstances, Kaziranga was protected from very dangerous global wildlife trade syndicates. Will the same measure of success now be transferred to other Assamese havens such as Manas, Orang and Dibru Saikhowa?

The Kaziranga Forest Department maintained a visitors' book in which people, down the ages, recorded their observations and suggestions. Such memories, written fresh from the field, constitute a part of Kaziranga's history. Selected excerpts from the year 1939 to 1975 are reproduced with permission from the Director, Kaziranga National Park.



GOVERNMENT HOUSE
SHILLONG
20th April 1948.

I have visited the Kaziranga Reserve twice. On the 29th February 1948 when I flew over the Reserve and my wife was lucky enough to see a rhinoceros; and on a second occasion on the 25th/27th March 1948 when we camped in the Forest Bungalow. Altogether 11 rhinoceroses were seen by my party and we also saw the two: 'Kaziram' and 'Kamalarani' who were recently caught and were due to go to the Chicago Zoo. We spent many hours on elephants going through the Reserve and in addition to rhinoceros we saw wild buffalo, swamp deer and pig. It seemed to me that just going on an elephant through the Reserve was not the best way of seeing animal life with which the Reserve teems. There should be tree houses for visitors at certain places. I noted three likely places — where animals come to drink — where they could stay for a few hours or for a day and watch animal life as it passes by. Also it should not be necessary for visitors to have to make special arrangements for visiting the Reserve. It should be made possible for any one to pay his fee and visit the Reserve. The fee should be inclusive of transport in the Reserve and occupation of part or whole of one or other of the tree houses. I have suggested to the Assam Government that action on the above lines should be taken and I hope that soon it may be possible for a larger number of people to see this interesting game sanctuary which is the last known home in the World of the one-horned Rhinoceros.

Sd. Akbar Hydari
Governor of Assam

First rhino charged us flat out. Last rhino (which had an old wound) we followed on foot and cine photographed.

E.P. Gee and party, April 6, 1939

A female rhinoceros with a left ear broken at the base has been frequently seen during this season between Goroimari *beel* and Mihi *beel*. The ear always remains turned down. The rhino seems to be quite young and her calf is most probably her first. She is of the long horn type and her horn is about six inches long.

Mahi Chandra Miri writing for the first time about 'Kan Kota', a rhino that became famous in subsequent years, April 28, 1939

Bravo 'Kan Kota', you old fraud rhino. If only one could be, in other spheres of life, as unconcerned as you were when you calmly looked at Mohan, Sher Khan and Akbar – the three gigantic elephants!

R.T. Rymbai, referring to the same rhino Miri had written about in 1939

Viewed five rhinos within an hour (9-10 a.m.). Last pair was aggressive and charged. The bull rhino met elephant Akbar head on. Akbar knelt to take the charge after a short, fierce struggle the rhino was scared away. Akbar's trunk was unfortunately gashed, which, it is hoped will soon recover. Several photos of the encounter were taken. This is perhaps the first record of a rhino charging an elephant. The *mahout* showed considerable skill and presence of mind, else the tusker would have been mortally injured.

Captain B. Van, Van Ingen and Van Ingen Taxidermists, Mysore, November 27, 1944

It has been my good fortune to have been sent to Assam by my Zoological Society for the purpose of chaperoning a pair of great Indian rhinoceroses to America. I was most fortunate in arriving in time to participate in their capture. Just visiting the sanctuary and seeing its wildlife was worth the trip from America, but to engage in the capture of Kashi and Karnala was a thrill beyond all expectations. I sincerely recommend a visit to Kaziranga to zoologists or adventurers to see *Rhinoceros unicornis* in its natural habitat.

Ralph Graham, Chicago Zoological Society, February 20-April 25, 1948

Compared to my last visit here in January 1947, the rhino situation seems to have deteriorated. In any case, I am not inclined to agree with the estimates of rhino currently given. A figure of one per sq. mile (i.e area 150) would seem to me more logical. Grazing of cattle and buffalo in the sanctuary is positively criminal and should be abolished. It is probably what caused 14 plus deaths of rhinos from anthrax mid-summer of 1947.

S. Dillon Ripley, Yale University, March 15-18, 1949

In an attempt to get an overall picture of the sanctuary area, as regards the extent of rhino country it covers and possibly as a means of devising some method of arriving at a reasonable estimate of the number of animals the sanctuary holds, an aerial flight over the area at about 400 feet was made on 24 March from Jorhat. It seems to me that the area near the southern boundary i.e. in the neighbourhood of Kaziranga, Kohora, is more likely to hold the greater proportion of the rhino population on account of the numerous *beels* scattered about it. The northern portions (still under tall unburnt grass) showed no signs of having many suitable *beels*.

Kohora, is more likely to hold the greater proportion of the rhino population on account of the numerous *beels* scattered about in it. The northern portions (still under tall unburnt grass) showed no signs of having many suitable *beels*.
– Sálim Ali, Hon. Secretary, B.N.H.S. March 15-23, 1949

From the plane, during the flight of 90 minutes, 12 rhinos were counted and 100 plus buffalo.

Dr. Sálim Ali, Hon. Secretary, B.N.H.S., March 15-23, 1949

I think a rhino census is of great value, but impossible owing to the tracks of heavy elephant grass jungle, and owing to the fact that the rhino is mainly a nocturnal animal. Mostly, rhinos are to be seen in the early morning and most of our visits were made later in the day for photographic reasons. Still, the opinion of Dr. Ripley and Dr. Sálim Ali that the rhino population may be very much less than believed by the Forest Department is very important and all steps must be taken to guard them carefully.

E. P. Gee, March 16, 20, 24, 1949

Though I saw 16 rhinos, I think that Dr. Ripley is right and the official figure of 500 is very arbitrary. I went out thrice on elephants and saw three, three and ten rhinos, but the area covered cannot be very accurately calculated and in any case, a direct computation of the total number of animals in the sanctuary also extends to the Brahmaputra and there is no doubt that conditions there are known to very few people. A detached ecological study of the rhino should precede any attempt at interfering with their territory or numbers.

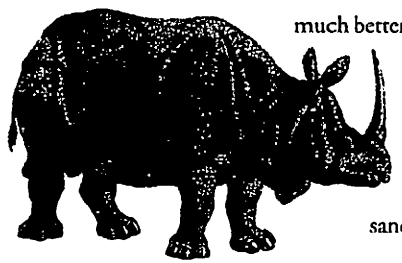
Humayun Abdulali, March 15-18, 1949

One tiger. What luck to see a tiger!

C.P.B. Westcott, March 9, 1954.

Himalayan black bear seen near Fulimari *beel*. This is I think the first record as seen by visitors to the sanctuary.

W.G.B Nicholetts, J.H. Bunnetto, April 4, 1954



Hearty congratulations to the Government of Assam for making Kaziranga what it is today. The rare one-horned rhinoceros has been saved from extinction. Much credit must also be given to P.D. Stracey and E.P. Gee.

R.S. Dharmakumarsinhji, Vice Chairman and Regional Secretary, Western Region. Indian Board for Wildlife, February 8-10, 1955

This is an outstanding asset of India. Having lived in India for four years, much of the time spent travelling in many other parts of the country, we have not found a more enjoyable or satisfying place to visit.

Dr. and Mrs. T.H. Work, March 24-27, 1958.

In no other sanctuary have I seen animals within a few minutes of entry. We saw 10 rhinos from the tower house and three on the way to it. Early this morning had a fine view of the snows of the Kangdo group – possibly exceptional luck in the middle of the monsoon.

Hamdi Bey, Journalist, The Statesman, *Calcutta, July 22, 1961*

I was very pleased to see a noticeable increase in the number of animals in spite of the recent severe floods. The Forest Department are to be congratulated on this increase in numbers. I noticed with regret the remarks made by a certain very distinguished visitor on January 6, 1963 that the road to the sanctuary is "in a shocking state".

It is actually not at all bad for the approach road to a sanctuary and much better than those in Africa. About introducing "many more varieties of wild animals" into Kaziranga, this should NOT be done, because the internationally and nationally accepted conditions of a national park or sanctuary are that the indigenous animals should be shown, and that foreign or exotic wildlife should not be introduced. Zebras and giraffes are best seen in Africa or in zoos in India. The indigenous fauna (and flora) of Kaziranga are what make it what it is – one of the best parks/sanctuaries of India.

E.P. Gee, Member I.U.C.N. & Central and State Wildlife Boards, January 19-24, 1963

An exciting day. A pair of rhinos mating were attracted by another male and there was a short battle in which the intruder was triumphant and drove the other off. The female appeared to have been hurt and had a bloody rear flank. With the victor snorting angrily and thrashing around in the tall grass, we made ourselves scarce in a hectic race on our elephant as we clung on for dear life. On a second trip, we had a confrontation with a big rhino, which was cowed. We went right over to the pelicanry where large numbers of young birds were still about. Some Adjutant Storks were resting with the pelicans.

Peter Jackson, Journalist, New Delhi, February 15, 1966

Expand the sanctuary to include the hills.

Professor Richard Durell, Geologist, University of Cincinnati, 1968

In seven enthralling days we have seen and photographed all the major species found in Kaziranga – including a tiger lying in a muddy pool, herds of elephants, buffalo fighting and the amazing rhinoceros. This is our third visit to Kaziranga during the *National Geographic* wildlife project in India – each more exciting and profitable than the next. Our thanks to the management of this outstanding natural park is immeasurable.

Stanley Breedon, Belinda Wright, National Geographic Magazine, *April 26–May 4, 1975*

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A French wildlife photographer, jazz musician and mathematics teacher, he spends his time travelling in India – in his words, "the most fascinating country in the world".

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Thakur Dalip Singh

An award-winning wildlife photographer, he is the great grandson of Satguru Ram Singhji, Founder of the Namdhari Sect in Punjab.

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A scientist who believes that conservation action should flow from good science, he works with the Wildlife Conservation Society, New York.

Dr. T. Shivanandappa

With a doctorate in zoology, he is the Deputy Director of the Central Food Technological Research Institute, India.

ACKNOWLEDGEMENTS

This book is an amalgam of many minds. It is a product of collective visions, experiences and contributions. The Editors merely orchestrated the end product.

The seed for the book was sown when we went out in search of conservation successes in India. After scouring the nation's tragic canvas over the past 100 years, it became clear that Kaziranga was one of India's success stories, measured by the fact that the Indian one-horned rhino, once written off, has made a dramatic comeback.

Our first acknowledgement, therefore, must be to the stalwarts past and present whose vision and courage over the past 100 years secured a piece of wild land for wild nature. Their task has not yet been accomplished. We hope this book will win the defenders of Kaziranga the support they need in the difficult days ahead.

When we approached possible sponsors, The Indian Hotels Company Ltd. and Oil India Ltd., Mr. Krishna Kumar and Mr. R.K. Datta respectively, confirmed their desire to be a part of the project without a moment's hesitation.

Support for *The Kaziranga Inheritance* has been overwhelming, a measure of the awe and regard that this rhino haven inspires in people from all walks of life.

We would also like to especially acknowledge young Maan Barua, who represents hope for Assam and India. He not only authored the chapter on birds but also played an important role in the creation of this visual tribute as did the many talented photographers he has worked with in Kaziranga, with whom he put us in touch. A.K. (Manju) Barua, always the sharp but caring critic, tried to keep the book true to the 'real' Kaziranga. We are grateful to Bhupen Talukdar and Pankaj Sharma for much more than mere help with information. They represent the spirit of Kaziranga. Dalip Pande quietly made things happen, swept obstacles from our path and helped us access information as if by magic. Mark Shand, the 'elephant man' who responded to our appeals for help by providing images of the Curzon family. Bikram Grewal, always a friend of *Sanctuary*, guided us through the minefield that is publishing, with insight, warmth and good humour.

The management and staff of Wild Grass Lodge are ambassadors for Kaziranga and the rhino. They have always lavished generous help on those they believe wish to protect Kaziranga. We are grateful to them.

No amount of gratitude can do justice to the way we feel about the foot soldiers of Kaziranga, to whom this book is dedicated. A special thanks to the Kaziranga Forest Department itself and the Director of Kaziranga, N.K. Vasu, who provided insights, logistics and valuable information. A special debt of gratitude goes out to all the photographers, separately acknowledged, without whom this book would not even have come off the blocks.

Farooq Issa of Phillips Antiques, Mumbai opened up his incredible collection and historical records. The Bombay Natural History Society, that grand institution that has documented wild India since 1883, permitted us to use the images that E.P. Gee left in their care when he died.

The staff of *Sanctuary* magazine must be among the least-recognised chroniclers of the conservation history of India. They worked beyond the call of duty and infused heart, not just mind, into these pages. Lakshmy Raman and Dr. Anish Andheria travelled to Kaziranga to bring back the many impressions and images depicted between these covers. Anish Andheria and Isaac Kehimkar went through the manuscripts and helped with identification and natural history. Tarini Mohan, a bright young student from the United States interned with *Sanctuary* and helped research the manuscript. Umesh Bobade was the design mind behind the book and his technical expertise has greatly enhanced our work. Rajkumar Gopalan worked on the maps and technically assisted Bobade. Henry Remedios helped with administration. Madhu Sahgal read manuscripts and helped sharpen our focus. Jennifer Scarlott laboured over some of the manuscripts from distant New York. The untiring efforts of Sonali Bhatia acted as oil in the manuscript's machinery. Shyla Boga, always a rock for *Sanctuary*, lent her eagle eye to weed out errors and give the manuscript a professional feel. Shivani Shah, part of *Sanctuary's* editorial team, spent endless hours cross-checking facts and helped build the book. Preeti Chopra helped with typing and researching essential last-minute additions. Kaziranga is an inheritance we collectively strive to protect in perpetuity.

BIBLIOGRAPHY/REFERENCES

Ali, S., Daniel, J.C. and Rahmani, A.R., 1985, Study of ecology of certain endangered species of wildlife and their habitats, The floricans, Annual Report 1, 1984-1985, Bombay Natural History Society, Bombay, pp. 79-84.

Barua, A.K. and Talukdar, B.N., Status of Tigers in Assam, 2000.

Barua, A.K. and Barthakur, Ranjit, The Great Flood, Ark-less in Kaziranga, Sanctuary Magazine XVIII No. 5 October 1998.

Barua, Maan S., 1998, On large congregation of northern Lapwings *Vanellus vanelus* in Kaziranga National Park, Assam NLBW 38 (3): 57.

Barua, Maan S.,1998, 200 species in a day in Kaziranga NLBW 38:15.

Barua, Maan S. and Pankaj Sharma,1999, Birds of Kaziranga National Park, India, Forktail 15: 47-60.

Barua, Maan S., Swamp Deer (unpublished).

Barua, Maan S., The Great Indian One-horned Rhinoceros (unpublished).

Bhat, H.R., 2003, Birding at Kaziranga National Park, *NLBW 43(6):87-88.*

Bradley Martin, E., Conservation Crisis, the Rhinoceros in India, *Oryx* Vol. 21 No. 3, October 1987.

Bradley Martin, E. and Vigne, L., 1989, Kaziranga's Calamity – a New Threat to the Indian Rhino, Oryx 23(3): 124-125.

Brahmachari, Rakshit and Mallik, Further attempts to determine the food habits of the Indian rhino at Kaziranga, BNHS.

Burger, J., 1990, Notes from the Field: Kaziranga National Park, India, Buzzworm: the Environmental Journal 2(2): 20-21.

Champion, H.G. and Seth, S.K., 1968, A revised survey of the forest types of India, New Delhi, Government of India publications.

Chaturvedi, M.D., The Vanishing Rhino of India, Cheetal Vol. 39.

Choudhury, Anwaruddin, Indian One-horned Rhino *Rhinoceros unicornis* Ligneous 1758, in Arunachal Pradesh, JBNHS, 1997.

Choudhury, Anwaruddin, Flood Havoc in Kaziranga, Pachyderm No. 26, July – Dec 1998.

Choudhury Anwaruddin, 2004, Kaziranga – Wildlife in Assam, Rupa & Co.

C.P. Oberai and B.S. Bonal, 2002, Kaziranga, the Rhino Land, BR. Publishing.

Divekar, H.K., Mohapatra, K.K. and Shekar, P.B. (1980), Some observations on wild buffalo, *Bubalus bubalus* Linn, in Kaziranga National Park, Assam, JBNHS, 79: 188-190.

Dutta, A.K. 1991, *Unicornis* – The Great One-horned Rhinoceros, Konark Publishers Pvt. Ltd.

Gauntlett, F.M., 1971, Kaziranga for Birds, Newsletter for birdwatchers 11 (1):4-8.

Gee, E.P., 1964, The Wild Life of India, Collins, London.

Gee, E.P., Management of Indian Wildlife Sanctuaries and National Parks, JBNHS.

Gokhale, A. Nitin and Kashyap, Gupta Samudra, 2005, Kaziranga, the Rhino Century.

Grewal, Bikram, Harvey, Bill and Pfister, Otto, 2002, A Photographic Guide to the Birds of India and the Indian Subcontinent.

Hamdi Bey, A Profile of Kaziranga, Cheetal, 10 (1-2), 1967.

Islam, M.H., 1974, Floods in Kaziranga, Oryx 12: 450-451.

Jain, S.K. and Sastry, A.R.K., 1983, Botany of some tiger habitats in India, Botanical Survey of India, Howrah. 71 pp.

Kushwaha, S.P.S. and Madhavan Unni, N.V., 1986, Applications of remote censing techniques in forest cover monitoring and habitat evaluation – a case study at Kaziranga National Park, Assam.

Kamat, D.S. and Panwar, H.S. (Eds), Wildlife habitat evaluation using remote sensing techniques, Indian Institute of Remote Sensing/ Wildlife Institute of India, Dehra Dun, pp. 157-164, pp. 238-247.

Laurie, W.A., 1978, The ecology and behaviour of the greater one-horned rhinoceros, Ph.D. thesis, University of Cambridge, U.K.

Mackenzie, M.J.S., 1969, A mid-winter waterfowl count in Kaziranga, Cheetal 12 (1): 16-20.

Menon, Vivek, Threats of rhino horn trade to the species in India, CBI Bulletin, February 1996.

Menon Vivek, Under siege – the greater one-horned rhinoceros, Sanctuary Magazine XVII No. 1 Jan/Feb 97.

Menon Vivek, 2003, A Field Guide to Indian Mammals.

Mukherjee, A.K., Endangered animals of India, Zoological Survey of India.

Narayan, G., Sankaran, R., Rosalind, L and Rahmani, A.R., 1989, The Floricans *Houbaropsis bengalensis* and *Sypheotides indica*, Annual Report 1988-89, Bombay Natural History Society, 39 pp.

Lahan P., and Sonowal, R.N., Brief Description and report on the census of large animals, March 1972, Kaziranga Wildlife Sanctuary, Assam, JBNHS, August Vol. 70, No. 2.

Parihar, J.S., Panigrahy, S. and Parihar, J.S., 1986, Remote sensing based habitat assessment of Kaziranga National Park.

Prater S.H., The Book of Indian Animals, BNHS.

Ranjitsinh, M. K. (1988), Kaziranga off threatened list, CNPPA Newsletter No. 44, IUCN, Gland. pp. 2.

Saikia, Arupjyoti, 2005, Jungles, Reserves, Wildlife – A History of Forests in Assam.

Samar Singh, A flight of rhinos, Sanctuary Magazine Vol. 1V No. 3, July/Sept 84.

Sharma, Pankaj, Barua Maan S. and Menon Vivek, 1997, Orangebilled Jungle Mynah and Hodgson's Bush Chat in Kaziranga National Park JBNHS 94:156-157.

Scott, D.A. (Ed.), 1989, A directory of Asian wetlands, IUCN, Gland, Switzerland and Cambridge, U.K. 1,181 pp.

Shahi, S.P., 1983, Rhino poaching in Kaziranga, WWF-India Newsletter 45: 5-6.

Spillett, J.J., 1966, A report on wild life surveys in North India and southern Nepal: the Kaziranga Wild Life Sanctuary, Assam, JBNHS 63: *494-533.*

Stracey, P. D., Elephant Gold.

Talukdar, Bibhab K., (1995), Pelicans fail to nest as normal at Kaziranga National Park in 1994, Oryx 29: 157.

Talukdar, B.N., Status, distribution and threat to water buffalo *Bubalus bubalis* in Assam (unpublished).

Talukdar, B.N., Grassland heritage of Assam (unpublished).

The Management Plan, Kaziranga Forest Department.

Thom, M., (1965) Bengal Florican in The Kaziranga Sanctuary, NLBW 5(7): 9.

Trouble in Kaziranga – A Sanctuary Report, Sanctuary Magazine, June 2003.

Verma K. (1987), Kaziranga National Park, Pp 223-225 in Israel, S. and Sinclair T., eds Insight Guide – Indian wildlife, Hong Kong Apa Productions.

Waller Richard, The great Indian one-horned rhino, with special reference to its main sanctuary, Kaziranga in Assam, Cheetal, Vol. 15 June 1972.

GLOSSARY

Ahom: the rulers of Assam from 1228 to 1826.

Barasingha: the twelve-point antlered Indian swamp deer.

Beel: swamp, a widely spread out body of stagnant water (same as *jheel* or wetland).

Bhainsa: buffalo.

Bihu: Festival in Assam, associated with the cultivation of paddy.

Bhutias: a Northeast tribe.

Chapori / Chaur: sandy river-island.

Dacoity: robbery by a gang of brigands.

Dandi: tunnel-like paths through tall grasslands created by rhinos and other large ungulates.

Duars: mountain passes from where various hill tribes descend to the plains from the Himalayan ranges.

Edaphic climax: an ecological climax resulting from soil factors, and commonly persisting through cycles of climatic and physiographic change.

Epidermally: attached to the skin, but not fused to the bone (reference to the rhino's horn).

Epiphyte: a plant, which is rooted onto another plant for support. It derives moisture from its aerial roots but is not parasitic e.g. orchid.

Genera: a group of animals with common structural characteristics.

Gestation period: time taken from a successful mating to the delivery of the offspring.

Habitat: a particular set of physical environmental factors that immediately surround living organisms.

Hastate: arrow-shaped leaves with the lobes pointing away from the petiole.

Hathi: elephant.

Holt: a den created by otters.

Home range: the area an animal covers to obtain food, mate and raise young.

Indomalayan Realm: Biogeographic zone comprising South and Southeast Asia, India, Malaysia and the Philippines.

Inflorescence: the arrangement of flowers on an axis or a flower cluster.

Kacharis: a tribe of Assam, also known as *Bodos.*

Keratin: a fibrous protein, the chief constituent of hair.

Khedda: an ancient system of catching elephants using the corral or stockade (enclosure) method.

Machan: platform in tree from which to observe animals.

Mahaldar: the owner of a land unit.

Mahals: traditional rights.

Mahout: elephant handler, who sits on its neck and controls and instructs the animal.

Mela: fair, usually related to religious festival or cattle market.

Monocotyledon: a plant of the *Monocotyledoneae*, a class of Angiospermae which includes vascular plants characterised by an embryo with a single cotyledon.

Nullah: small ravine or stream.

Oestrus: the heat period in a female when she is sexually active.

Oligomictic: irregular or sporadic circulating or mixing

O-tenga: elephant-apple

Ox-bow lake: a crescent-shaped lake formed when the river cuts across a narrow end.

Placental: pertaining to the placenta.

Prehensile: adaptation that enables grasping, used in the context of the rhino lip.

Reed: variety of tall perennial grasses.

Saprophyte: plant that obtains its nourishment from dead or decaying organic matter, as most fungi.

Saggitate: arrow-shaped leaves, with the lobes pointing down.

Savanna: tropical grassland.

Shikar: hunting, shooting, catching.

Shikari: hunter.

Simul: Indian silk cotton tree or *Bombax.*

Subedar: junior commissioned officer in the Indian Army.

Terai: swampy or moist area some distance south of the Himalayan foothills.

Terrestrial: 1. adapted to and living on land; not aquatic 2. bot. Growing on the ground.

Translocation: transfer of an animal from one place to another.

Vaishnava sect: one of four key Hindu sects, devoted to Lord Vishnu.

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Phillips Antiques: Back cover (Drawn by W. Daniell, R.A., Engraved by J. Redaway Published 1834), 26 (map of old Asia), 28 (The Spectacle of Empire by Jan Morris, Faber and faber, London), 30 (aquatint), 68 (top left), 75 and 77 (Indian Sporting Birds by Frank Finn, Francis and Edwards, London, 1915).

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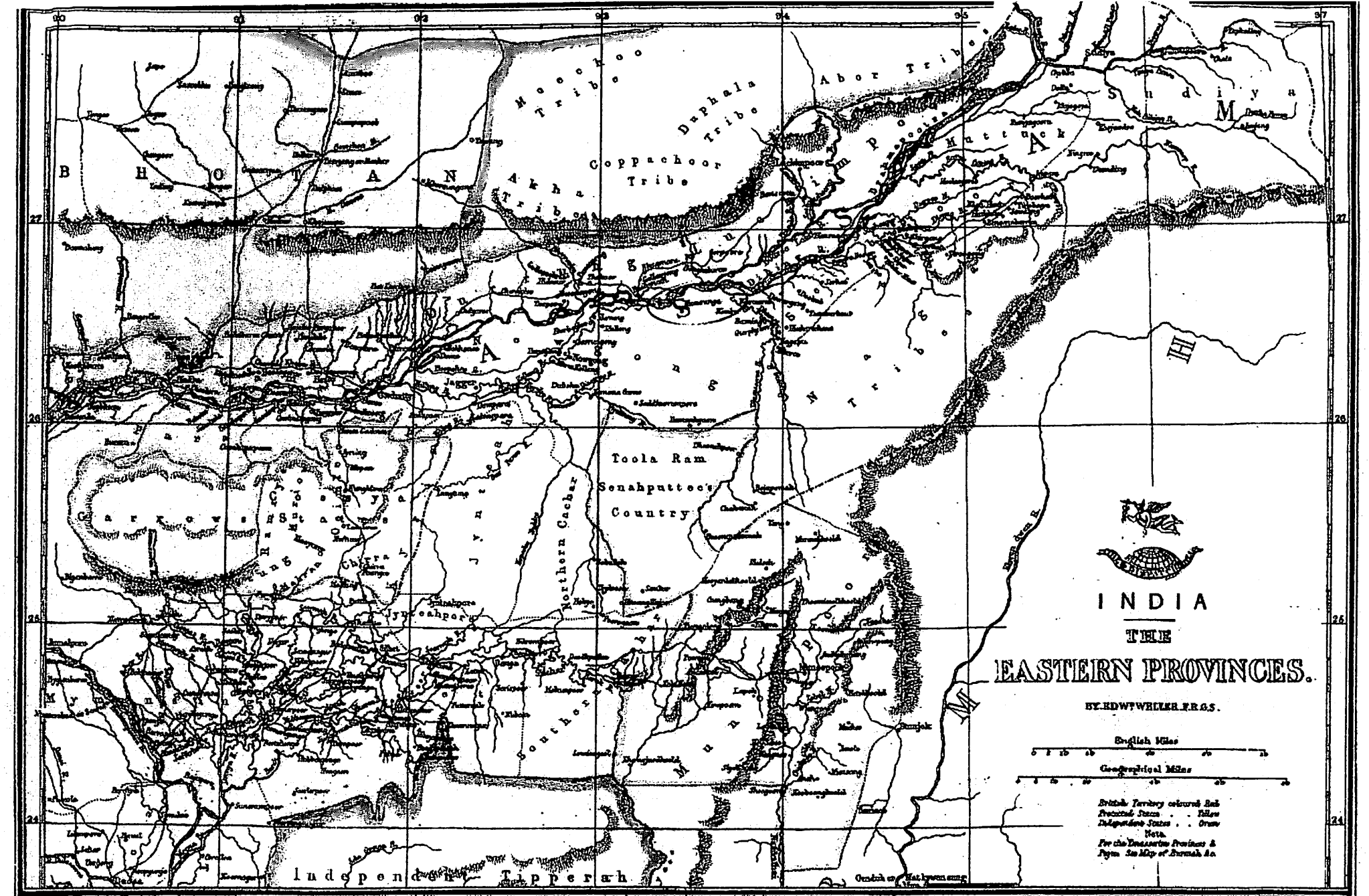

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