A Brief Note
on

KAZIRANGA NATIONAL PARK
WORLD HERITAGE SITE

A
NATURAL WONDER OF THE WORLD

BY

THE OFFICIAL SUPPORT COMMITTEE
KAZIRANGA NATIONAL PARK

ENVIRONMENT AND FOREST DEPARTMENT

GOVERNMENT OF ASSAM

1. INTRODUCTION

KAZIRANGA NATIONAL PARK, a name known worldwide for its success in the conservation history of one horned Indian Rhinoceros, provides habitat for a number of threatened species and migratory birds. A symbol of dedication for the conservation of animals and their habitat, Kaziranga, with a National Park status represents single large established protected area within the Burma Monsoon Forest Biogeographically Province to provide long term viable conservation.

Spread over civil jurisdictions of Nagaon and Golaghat districts in Assam with mighty Brahmaputra river on the north and verdant Karbi Anglong hills on the south between Longitude 92º50′ E & 93º 41′ E and Latitude 26º 30′N and 26º 50′ N, Kaziranga National Park is an out standing example representing significant on going ecological and biological processes in the evolution and development of wet land ecosystem and communities of plants and animals. Kaziranga contains the most important and significant natural habitat for in-situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation. The above mentioned values and criteria made Kaziranga National Park to get inscribed on the world heritage list of "Convention concerning the protection of the world cultural and natural heritage" in the year 1985.

Some of the unique and significant conservation values of Kaziranga National Park are enumerated below: -

The largest undisturbed and representative area of Brahmaputra Valley flood plain grassland and forest with associated large herbivores, avifauna and wetland values (including Turtle, Dolphin etc.).

- THE WORLD 'S LARGEST POPULATION OF
  1. Indian One Horned Rhinoceros
  2. Wild Buffalo

- HIGH ECOLOGICAL DENSITY OF TIGERS

- Significant population of Asiatic Elephant

- The junction of the East Asia /Australia flyway and Indo-Asian flyway exhibits considerable diversity in avifaunal species.

- Transitional and successional example of grassland to forest and floodplain to hill evergreen forest communities.

- Considerable research, education and recreation values.

Milestones of Kaziranga …

- 1905 – Preliminary notification of Kaziranga as Reserve Forest.
- 1908 – Kaziranga declared as Reserve Forest.
- 1916 – Kaziranga Reserve declared as Game Sanctuary.
- 1937 – Sanctuary opened for visitors.
- 1950 – Kaziranga Game Sanctuary was named as Kaziranga Wildlife Sanctuary
- 1974 – Declaration of sanctuary as Kaziranga National Park
- 1985 – Park was inscribed as World Heritage Site by UNESCO-IUCN
- 2005 – The year 2005 was centenary year of successful biodiversity conservation of the Kaziranga National Park.

2. STATUS OF KAZIRANGA NATIONAL PARK

The entire Kaziranga National Park area was formed by the alluvial deposits of the Brahmaputra river and its smaller tributaries, which carry a great amount of silt during the rainy season every year. The riverine area thus formed is colonised by saccharum and other grass species as soon as the landmasses are stabilized. But sometimes, it is observed that before the succession of other pioneer tree species could start on such landmasses, they get eroded. Probably numerous channels of the Brahmaputra river criss crossing the entire area were once flowing through Kaziranga in the past and in course of time silt depositions and changing course of the Brahmaputra river formed into the 'Beels'(water bodies/ lakes) of various sizes and depth. This process of erosion and formation of landmasses are still going on along the Northern Boundary of Kaziranga National Park.

In the past, adjoining forests of Karbi Anglong and Grassland of Kaziranga National Park formed one single unit of ideal wildlife habitat and were very thinly populated area. But with gradual opening up of the area on the southern side of the present National Highway No.37, the forest covers were ruthlessly cut down and damaging the habitat of wild animals by the human settlers and tea planters went on at alarming rate. The Great Indian One Horned Rhinoceros was once distributed all over the upper Gangetic plains and the Brahmaputra valley. However, today substantial number is confined to Kaziranga National Park only. Nevertheless, due to timely realization of the gravity of the problem, the Govt. of Assam initiated the proposal to declare Kaziranga as a Reserved Forests in the year 1903-04 primarily to preserve wildlife in general and Rhinoceros in particular, with an area of 57,273.6 acres of land. Finally an area of 56,544 acres of land was declared as Reserved Forests vide Notification No. 37.F dated 3rd January 1908. In November 1916 the area was declared as a "Game Sanctuary" and in 1950 renamed as "Kaziranga Wildlife Sanctuary". In the year, the area was declared as "Kaziranga National Park" vide Govt. Notification No.FOR/WL/722/48/45, dated 11-02-74 with effect from 01-01-74 with an area of 429.93 Sq. Km.

With the establishment of Tea Gardens, human habitations and agricultural activities on the periphery of the southern boundary of the park, it has now increasingly become difficult for the wild animals to move across to the Hills during high flood season, and the animals fall easy prey to avarice of poachers. On the other hand due to constant erosion along the northern boundary and accretion in the form of chapories (Riverine Island), the animals moves to the chapories as these constitute extended natural habitat for wildlife. Moreover, over the years the

resident population of Rhinoceros as well as other mega herbivores i.e. Elephants and wild Buffaloes of Kaziranga have increased manifold while the geographical area of Kaziranga National park have been reduced considerably by cut bank erosion of the Brahmaputra. With these background during mid eighties the Government of Assam had notified a number of proposed Addition to Kaziranga National Park in order to secure corridors for migration of wild animals, and escape routes in case of high flooding and for extending the Park by inclusion of the chapories of Brahmaputra to compensate for loss of park area due to erosion.

Kaziranga National Park Area

NAME OF THE NATIONAL PARK/ ADDITION	AREA (Sq.Km)	DATE OF NOTIFICATION (PRELIMINARY)	FINAL NOTIFICATION DATE
Kaziranga National Park	429.93		11-2-1974
1st Addition to KNP	043.79	28.9.84	28-05-97
2nd Addition to KNP	006.47	10.07.85	Not completed
3rd Addition to KNP	000.69	31.05.85	Not completed
4th Addition to KNP	000.89	13.06.85	3-8-1988
5th Addition to KNP	001.15	13.06.85	Not completed
6th Addition to KNP	376.50	10.9.84	07-08-99
Total	**859.42**		

The adjoining Panbari RF and Kukurakata RF, each with an area of 7.65 sq km & 15.93 sq km respectively, are also part of the overall management of the Kaziranga National Park. Thus the total area of Kaziranga becomes 882 sq km.

3. Flora and Fauna

Flora:

The floristic composition of the Kaziranga National Park comprises of following forest types and biomes (Champion and Seth, 1968):

- Eastern Wet alluvial grasslands **4D / 2S2**
- Assam Alluvial plains Semi-evergreen forests **2B/C1a**
- Tropical moist mixed deciduous forests **3C3**
- Eastern *Dillenia* Swamp forests **4D/SS5**
- Wetlands
- Sandy "*chars*"

Area under different land cover types in Kaziranga based on visual interpretation of satellite imagery (Kushwaha, 1997) are as under.

Sl.No.	Land Cover Type	Area (Sq.Km.)	% Area
1	Woodland	114.01	27.95
2	Short grass	12.30	3.01
3	Tall Grass	248.85	61.01
4	*Beel*s	24.32	5.96
5	Jiya Daphlu	3.96	0.97
6	Mora Diphlu	2.84	0.70
7	Sand	1.62	0.40
Total		****407.90**	**100.00**

**** Eroded Area excluded.**

Grasslands dominate in the west, with tall 'elephant' grasses on the higher grounds and short grasses on the lower grounds surrounding the water bodies or 'beels'. They have been maintained by annual flooding and burning over the years. Amidst the grasses are numerous shurbs and scattered trees of Bombax ceiba, Dillenia indica, Careva arborea and Emblica officinallis. Tropical wet evergreen forests are dominated by trees such as *Aphanemixis polystachya, Talauma hodgsonii, Dillenia indica, Garcinia tinctoria, Ficus rumphii, Cinnamomum bejolghota*, and species of *syzygium*.

Common trees and shrubs under semi evergreen composition are *Albizia procera, Duabanga grandiflora, Lagerstroemia speciosa, Crateva unilocularis, Sterculia urens, Grewia serrulata, Mallotus philippensis, Bridelia retusa, Aphania rubra, Leea indicaand Leea umbraculifera*.

*The vegetation cover under different types are as follows:

Moist mixed deciduous forest	29.13%
Grass land	51.91%
Water logged/Beels	6.62%
Swampy/Marshy area	5.21%
Sand	7.12%

(*Goswami and Barua,1996).

Fauna:

Mammals:

The Kaziranga National Park supports more than 35 species of mammals of which 15 belong to Schedule I of Wildlife Protection Act'1972. It harbours the World's largest population of Indian Rhinoceros(*Rhinoceros unicornis*) and Asiatic Wild Buffalo(*Bubulas bubalis*) and provides optimal habitat for Royal Bengal Tiger(*Panthera tigris*) to attain their highest ecological density. Other mammals include Capped Langur (*Presbytis pileatus*), Hoolock Gibbon(*Hylobates hoolock*), Leopard(*Panthera pardus*), Sloth Bear(*Melursus ursinus*), Indian Elephant(*Elephus maximus*), Gangetic Dolphin(*Platanista gangetica*), Otter(*Lutra lutra*), Wild Boar(*Sus scrofa*), Gaur(*Bos gaurus*), Sambar(*Cervus unicolor*), Swamp Deer(*Cervus duvauceli*), Hog Deer(*Axis porcinus*), Barking Deer(*Muntiacus muntjak*), Common langur(*Presbytis entellus*), Rhesus Macaque(*Macaca mulatta*), Assamese Macaque(*Macaca assamensies*), Indian Porcupine(*Hystrix indica*), Fishing Cat(*Felis viverrina*), Jungle Cat(*Felis chaus*), Large Indian Civet(*Viverra zibetha*), Small Indian Civet(*Viverricula indica*), Common Mongoose(*Herpestes edwrdsi*), Small Indian Mongoose(*Herpestes auropunctatus*), Indian Fox(*Vulpes bengalensis*), Jackal(*Canis aureus*), Chinese Ferret Badger(*Melogale moschata*), Hog Badger(*Arctonyx collaries*), Eastern Mole(*Talpa micrura*), Pangolin(*Manis crassicaudata*), Squirrel(*Dremnonys lokriah*), Bats(*various species*) etc.

Birds:

Numerous water bodies constitute rich reservoir of food and thousands of migratory birds representing over hundred species visit the parks seasonally during winter from as far as Siberia. A total of 478 species has been recorded (M.Barua and P.Sharma,1999) including 25 globally threatened species and 21 near threatened

species.The globally threatened species recorded in Kaziranga National Park are Swamp Francolin (*Francolinus gularis*), Lesser White fronted Goose(*Anser erythropus)*, Ferruginous Pochard (*Aythya nyroca*), Baer's Pochard(*A. baeri*), Blyth's Kingfisher(*Alcedo hercules*), Pale capped Pigeon(*Columba punicea*),Bengal Florican(*Houbaropsis bengalensis*), Nordmann's Greenshank(*Tringa guttifer*), Black bellied Tern(*Sterna acuticauda*), Palla's Fish Eagle(*Haliaeetus leucoryphus*), Greater spotted Eagle(*Aquila clanga*), Imperial Eagle(*A.heliaca*), Lesser Kestrel(*Falco naumanni*), White bellied Heron(*Ardea insignis*), Spot billed Pelican (*Pelecanus philippensis*), Dalmatian Pelican (*P.crispus*), Greater Adjutant (*Leptoptilos dubius*), Lesser Adjutant (*L.javanicus*), Hodgson's Bushchat (*Saxicola insignis*), Rufous vented Prinia (*Prinia burnesii*), Bristled Grassbird (*Chaetornis striatus*), Mah Babbler (*Pellorneum palustre*), Jerdon's Babbler (*Chrysomma altirostre*), Black breasted Parrotbill (*Paradoxornis flavirostris*), Finn's Weaver (*Ploceus megarhynchus*). Besides there are more than 40 species of fishes, 7 species of Reptiles, 5 species of Amphibian are recorded in Kaziranga National Park.

POPULATION FIGURES OF IMPORTANT WILD ANIMALS

Species	Y E A R									
	1991	**1993**	**1997**	**1999**	**2000**	**2001**	**2002**	**2005**	**2006**	**2008**
RHINO	1129	1164	-	1552	-	-	-	-	1855	*
ELEPHANT	-	1094	945	-	-	-	1048	1246	--	1293
TIGER	-	72	80	-	86	-	-	-	--	-----
SWAMP DEER	-	-	-	398	468	-	-	-	681 (in 2007)	-----
WILD BUFFALO	-	-	-	1192	-	1431	-	-	--	1943

•RHINO- 2048 As per census conducted in 2009.

4. Habitat Management:

The other important aspect of management in Kaziranga is to maintain the seral stage of grassland by preventing invasion of tree forest. This is achieved primarily through annual burning of grasslands so as to discourage the growth of tree sapling. The operation also helps in enhancing the nutritional value of coarse grasses by facilitating growth of new shoots, which attract the herbivores.

De-Siltation: It is observed that a number of water bodies inside the Park have shrunk in size due to siltation caused by flood. As the wetlands are an integral part of ecosystem in Kaziranga de-siltation works of water bodies have been executed for last many years.

Control of Weeds: The proliferation of various weeds like Mikenia*, Mimosa* and *Eichhornia*, causes ecological degradation of the habitat and is a major problem confronting the Park authorities. Some serious efforts such as *Mimosa* removal, removal of water hyacinth etc. have also been made in the recent past.

Bund Construction: With the onset of dry season, bunds are also constructed in some of the *Beel*s(water bodies) to retain water to attract various species of migratory avifauna.

Highland Construction: Some highlands have been constructed inside the Park to provide shelter to the animals during high flood. However, some more highlands with bigger dimension are required to be constructed to provide shelter to the marooned animals.

Woodland Manipulation:Another management practice adopted in Kaziranga is the uprooting of tree sapling to prevent invasion tree forest into grassland areas

5. WILDLIFE CONSERVATION STRATEGIES:

Wild life conservation strategies consist of mainly two components viz. **Anti-poaching activities** to counter the threat of organized gangs of poachers and **Habitat manipulation** to maintain the grasslands, wet lands in perpetuity to provide a suitable habitat for the Rhinos and other wildlife.

Anti poaching activities:

With the increase in poaching activities from 1980s to late 1990s with a number rising to 48 rhinos in the year 1992 anti-poaching activities both inside the Park and outside were strengthened. The number of anti-poaching camps manned with armed front line and incremental staff have rising to the present figure of 121. Though the poaching number have come down maintenance of these arrangements require resources in the form of man power, logistic support to the camp, mobility of the staff, infrastructures (buildings, roads, patrolling paths), equipment etc. to keep the high moral and efficiency for performing the most difficult tasks. The present situation is highly inadequate and may adversely affect the protection mechanism if it continues for long.

The anti-poaching activities in Kaziranga National Park may again be divided into three phases as detailed below:

Pre-entry: The main activity in this phase is proactive action that include intelligence gathering on the activities of poachers in the vicinity of the Park. The intelligence gatherer are usually local villagers or poachers who had turned over a new leaf. Effort are also made by the park authorities to involve the local people in furnishing information on the movement of poacher through implementation of Eco-development works as well as massive education and awareness drive in the fringe villages of the National Park. Post entry: This calls for reactive action which denotes the activities undertaken by the staff to track down and apprehend the poachers inside the Park, if any information regarding such intrusion is received by the Park authorities from any informer. The logistics of such track down operation is enormous and calls for radical improvement in the existing infrastructure for anti-poaching operations viz. improvement of surface communication and radio communication network, up gradation of arms & ammunition, improvement in accommodation facilities for field staff, greater mobility on land surface and water through procurement of vehicles and boats, augmentation of surveillance facilities through construction of watch tower on suitable locations etc.

Post exit: This is the investigative action after the poachers escape from the park, usually after committing an offence inside the Park. This phase mainly consists of co-ordination with other law-enforcing Departments e.g. Police to keep track of the poachers and nab them. However, past experiences have shown that though the poachers are apprehended but they are seldom convicted in the court as the cases on behalf of the Department are not properly represented. Therefore, a legal cell may be constituted to pursue the cases related to rhino poaching for conviction of the poachers. Besides, a system of **reward for the staff** as an incentive to recognize their efforts in apprehending rhino poachers, is also required.

There are number of cases where the anti-poaching staffs are bitten and injured by rhinos, tiger and other wild animals rendering them invalid for normal duty. The meager medical allowance they receive is not at all sufficient for proper treatment. As such provision for medical help is very essential.

The anti-poaching infrastructure in newly acquired additions and reserve forests is highly inadequate and practically non-existent in many areas. Moreover, the protection activities on the north bank of the Brahmaputra cannot be effectively supervised with the administrative head quarters along the southern boundary due to difficulty of immediate access to the north bank. The only solution to the problem is establishment of a new Range head quarter at north bank.

6. CONSTRAINTS OF MANAGEMENT:

A. FLOOD :

Floods are always considered to be a dreaded period for Kaziranga National Park and its animal life but since last decade the increasing level of multi wave flood is really threatening the future of the Park and not only the Rhino. Due to various reasons, mainly deforestation in the upper catchments area of the Brahmaputra, the intensity of the flood is continuously on the rise. During flood most of the animals including the Rhinos have to migrate from the Park and take shelter on the adjacent high grounds in Karbi Anglong Hills or wherever they may find shelter. These areas are populated and protection of the animals during the period of migration from and back to the Park becomes an uphill task as enforcement network is almost non-existent in such areas. Many animals, especially the deer and particularly the young, old and infirm lose their lives by drowning, poaching or run over by vehicular traffic on the National Highway.

Flood is also necessary and beneficial for maintaining the ecology of the grasslands and forests though it has some adverse effect. The gradual rising of the water level and quick recession is undoubtedly beneficial but floods of severe intensity which submerge the entire Park for a prolonged period deprive the animals from food and shelter.

B. EROSION :

The River Brahmaputra along the Northern boundary is well known for bank erosion as also huge accretion that is caused by depositing of silt during annual floods. These accretions gradually get established in the form of large and small

islands and are colonized by grass thus forming ideal Rhino habitat. But the land in the National Park is also eroded by floods and has already been reduced considerably, specially during the last three decades. The present area of the Park, taking into account, the erosion as well as accretion, during a period of thirty years, as computed from analysis of remote sensing data is 408 Sq.Km. On the other hand the population of all the mega herbivores have increased manifold during the same period. Therefore, to attain the goal of progressive increase in the population of Rhino as well as other species, it is essential that additional area are included in the Park by way of finalization of the proposal for Six Addition areas to Kaziranga National Park which are pending for a protracted period due to legal, administrative and financial reasons.

Though the prime habitat of the PA is reduced due to erosion, the eroded area is not lost and becomes the part of sixth addition to KNP in the form of water bodies or land mass. The Brahmaputra Board, Guwahati alongwith ISRO, Ahmedabad did study based on satellite data and they recommended number of suggestions for short term and long term measures to check erosion needs to be looked into by the technical department -viz- E&D, Flood Control Department etc.

C.HABITAT DEGRADATION:
Consequent to recurrent flood, several water bodies or beels in the Park have shrunk in size due to siltation. Besides, deposition of sand in short grass areas have also degraded the suitability of such areas for the herbivores. The grasses growing in such areas have to emerge through the sandy deposits and are coarse, thick and not very palatable to the foraging animals. The invasion of weeds like water hyacinth in water bodies and mikenia, mimosa in prime grassy areas is also a serious threat to the park and its denizens. Since siltation of the water bodies is one of most, prominent contributory factors towards Habitat degradation, desiltation of the water bodies in Kaziranga National Park needs to be taken up on a priority basis.

D. POACHING :
Poaching of Rhinos has been the major threat to the Kaziranga National Park and will continue to do so as the superstitious belief regarding the aphrodisiac and medicinal value attributed to the Rhino horn persists. It has been observed and experienced that the intensity of poaching increased mainly due to escalation in high value of the horn consequent to imposing ban on its trade. The last sale of Rhino horns in Assam took place during 1978 and though tenders were invited during 1980, sale was stopped. That marked the beginning of greater intensity of poaching in Kaziranga National Park as well as other Rhino inhabited areas. However, in recent months the onslaught of poachers in Kaziranga had been contained to considerable extent.

E. CROP RAIDING:
The animal depredation on crop and property and occasional cattle lifting by large predators cause considerable hardship to the poor people who reside on the fringe of the National Park. These people depend on their crop for living and most work their land with plough animals. When their crops are destroyed by animals or their plough animals killed by predators, their economy is shattered. Antagonism towards wildlife is a natural reaction. No amount of preaching and education on

conservation can retrieve the situation. Thus it is essential for the Department to provide some material help to these people through compensation for crop losses and loss of livestock because of animal predation. Therefore, to encourage cordial relation between the Park authorities and the villagers living in the fringe areas of the Park and also to involve these people actively in conservation efforts, Eco-development works by the Park managers in the peripheral areas of the Park needs to be taken up on a larger scale.

F. SHORTAGE OF STAFF AND INFRASTUCTURE:
The existing sanctioned strength of staff for managing the KNP is running short by 127 positions lying vacant. Further, with more areas added to the KNP, additional staff and infrastructure is needed for effective control over the additional areas.

7. Tourism:

Almost for a quarter of a century after its constitution into a reserve forest Kaziranga had a very uneventful existence. It was considered to be an inaccessible tract with impenetrable masses of reeds, cane brakes and swamps. Only the Forest Officers and the poachers as well used to travel in the area. Interested wildlife lovers occasionally used to accompany the forest officers. There was no road, no path or track inside the forest except the trails laid out by the regular movement of the animals. Very few people knew about Kaziranga and probably fewer people were interested in the preservation of the rhinoceros and other wild animals But with the general decline of the status of Wild Life population all over the country due to destruction of habitat and indiscriminate killing, there was a growing awareness amongst some section of Wildlife and nature lovers that it was high time to do something to preserve our wildlife. Due to this awareness people started taking interest in Kaziranga in this part of the country. As a result Kaziranga was opened to interested visitors in **1937** & two elephants were posted for taking the visitors into the sanctuary. Kaziranga's name and fame as one of the best spots for wildlife viewing and its popularity amongst the tourists has been growing since then. One can easily see a rhinoceros with cent percent certainty on any day of the year and at any time of the day along with scores of other animals such as the hog deer, wild buffalo, pigs, etc. Kaziranga occupies a significant position in the international tourist map today as one of the best wildlife resorts in the world. But prior to 1950 the facilities for tourists were limited and the accommodation consisted mainly of a P.W.D. inspection bungalow at Kaziranga and a Forest rest house at Baguri. This accommodation was found grossly inadequate for meeting the demands of increasing number of incoming visitors due to which one visitors camp at Kaziranga and later on two tourist lodge were constructed by the department on small hillock at Kohora and one Forest Rest House was also constructed at Arimora. The management of these two Tourist Lodges was handed over to the Tourism Department in 1963 after the creation of this new department under the Govt. of Assam.

At present 4 numbers of Govt. tourist lodges of different categories are existing at Kohora which comes under the Tourism Department. In the recent past some private lodges have also come into existence in this locality. The Park has 3 number of tourist routes located inside the Park under the jurisdiction of 3

Ranges viz. Kohora, Bagori and Agoratoli. These roads are open to light vehicles from November to mid May. Visitors willing to view wild life by motor cars are conducted through these roads by the staff of this department. The visitors are allowed to take in there own vehicles also. The visit to the park by road is much more interesting and thrilling as one can travel with the hope of coming across any animals in every corner of the road and can see the cross-section of the vegetation completely with numerous *Beel*s and favorite hunting and foraging spots of the animals.

There are few watch towers located in the tourist zone from where wild animals can be seen. Foot safari is not allowed at the movement and driving inside the park at night is prohibited. No visitor is allowed to enter the park without a man of the forest department accompanying him. The number of tourists who have visited Kaziranga and the revenue realized by the Forest Department from them are shown below:

No. of tourists/ visitors, visiting the National Park annually

Year	Tourists			Revenue (INR)
	Indian	Foreigners	Total	
1997-1998	17117	2408	19525	2,197,068.00
1998-1999	18157	1091	19248	1,802,856.00
1999-2000	37696	1623	39319	2,229,291.00
2000-2001	50498	1838	52336	3,038,258.00
2001-2002	44162	2144	46306	3,494,084.00
2002-2003	59811	2055	61866	5,360,425.00
2003-2004	57864	3773	61637	6,138,657.00
2004-2005	67719	5154	72873	6,612,508.00
2005-2006	72362	4711	77073	7,641,019.00
2006-2007	67926	5748	73674	7,974,749.00
2007-2008	53640	6106	59746	8,734,185.00
2008-2009	100284	5767	106051	11,220,689.00

Kaziranga National Park is an attraction for tourists, researchers, naturalists, wildlife enthusiasts, Statesmen & women all over the world. The Park has been visited by the Kings, Princes, Princesses, Prime Ministers & Presidents, Ambassadors & High Commissioners, Governors and Ministers from across the world. A list has been shown at http://www.assamforest.in/knp-osc/linkpages.php?u=vww showing some of the visitors to the Park since 1939.

8. KAZIRANGA ECO-SYSTEM & DYNAMICS OF NATURE:

Formation of Kaziranga Eco-System:

The Kaziranga is a made and nurtured by the Brahmaputra. The entire Kaziranga National Park area has been formed by the alluvial deposits of the Brahmaputra

river and its smaller tributaries mainly Dhansiri & Difalu River originating in high rainfall area of Nagaland and Karbi Anglong hills. These rivers carry a large amount of silt during the Monsoon season every year. The area thus formed by silt or sediment deposition is colonised by *Saccharum and* other grass species as soon as the landmasses are stabilized. Sometimes, it has been observed that before the succession of other pioneer tree species could start on such landmasses, erosion takes place. Though data from geological study are rare, it is probable that numerous channels of the Brahmaputra river flowing through the area in the past formed into the *'Beels'*(water bodies/ lakes) of various sizes and depth by silt/sediment deposition. This process of erosion and accretion is still going on along the Northern Boundary of Kaziranga National Park.

In the past, adjoining forests of Karbi Anglong and Grassland of Kaziranga National Park formed one single unit of ideal wildlife habitat with very few human habitations. But with gradual opening up of the area on the southern side of the present National Highway No.37, the forest cover diminished resulting in loss of natural wild habitat. This was mostly done by the human settlers and tea planters.

With the establishment of Tea Gardens, human habitations and agricultural activities on the periphery of the southern boundary of the park, it has now increasingly become difficult for the wild animals to move across to the Hills during high flood season, and the animals fall easy prey to avarice of poachers. On the other hand due to constant erosion along the northern boundary and accretion in the form of *chapories* (River Island), the animals moves to the *chapories* as these constitute extended natural habitat for wildlife. Moreover, over the years the resident population of Rhinoceros as well as other mega herbivores i.e. Elephants and wild Buffaloes of Kaziranga have increased manifold while the landmass of Kaziranga National park has been reduced considerably by cut bank erosion of the Brahmaputra.

From the geological and geo-morphological mapping of the Kaziranga area(Surendranath and Sharma, 1991), it is seen that the area of the Kaziranga National Park predominantly comprises of recent composite alluvial plains and floodplains. The channels and point bars, back swamps deposits are quite conspicuous in the active flood plain of the park area. Lithologically the Kaziranga formation is represented by grey silt and fine to medium sands which form the recent composite flood plain with numerous meander scars and scrolls. palaeochannels and abandoned channels of the Kaziranga unit belonging to the Holocene period of quaternary ages. The area is swampy and is criss-crossed by a number of channels flowing through the park area. The park is characterised by numerous permanent water bodies locally known as *"Beels"*. The Brahmaputra River flows along the northern boundary of the Park exhibits braiding pattern with numerous river island (*char / chapories*). Two type of *Char / chapories* are encountered-stable and unstable. Stable islands have large areal extent and have tall grass cover whereas unstable islands are devoid of grass cover. The left bank of the Brahamputra River which forms the boundary of the national park is very steep and its height varies from 3 to 7 meters. Due to the changing pattern of the river the left bank of the river erodes away considerable stretch of the land along its banks severely affecting the National Park. The Kaziranga National Park is characterised by a numerous swamps /*Beel* complexes, along with a thick vegetation cover. The soil overlying the sandy deposits at places is very deep while at some places it is of very recent origin

consisting mainly of sand, devoid of any humus or decomposed organic matter. As such the soil at various places varies from sandy soil, sandy loam, and clayey loam to purely clayey soil.

Dynamic nature of Kaziranga:

Kaziranga National Park is a famous **natural World Heritage Site** because of its dynamic nature. Its natural processes are very dynamic. Kaziranga is an outstanding example representing significant ongoing ecological and biological processes in the evolution and development of natural ecosystems consisting of several communities of plants and animals. Kaziranga is the most important and significant natural habitat for *in-situ* conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science and Biodiversity Conservation with Rhino as the flagship species.

Some of significant dynamic attributes are listed below:

1.Erosion & accretion: park area gets eroded and new wildlife habitat get formed in new river island(6^{th} addition area)

2. Movement pattern of the wild animal: Denizens of Kaziranga evolved to co-exist with water. Significant populations of wild animals move to higher ground prior to Monsoon and during flood go to Karbi-Anglong hills by crossing NH-37. Just after the after the flood again come to the park.

3.Seasonal transformation of vegetation is awe inspiring: new short grass sprout after Monsoon shortly became thick and fleshy fodder for harbivores in November-December. Old, drying tall grasses are burned in controlled/planned manner and new green grasses cover vast expanses from April onwards.

Flood in Kaziranga & Brahmaputra:

During the monsoon season every year the river system originating in the Karbi Anglong & Nagaland Hills and flowing through the Park inundate Kaziranga by overflowing the banks and fill up low lying areas. Brahmaputra River bed have been raised by the 1950 earthquake and the gradual silt deposition in such a way that the runoff from this catchment areas during the monsoon cannot be contained in the existing channels of this river. As a result flood has become an annual feature for Kaziranga. Depending on the intensity of the rain in the catchment areas of the Brahmaputra River and its tributaries in the upper reaches floods of varying intensity are experienced in Kaziranga. Though the annual average rainfall in the entire upper catchment areas of the Brahmaputra River and its tributaries may not differ much in a year the intensity of floods in its basin varies due to the intensity of rain in concentrated spells. Depending on such spells of intensive rains flood may occur a number of times in the same year.

In Kaziranga as long as the Brahmaputra River remains below the flood level, the runoff from the river originating in the Karbi Anglong Hills is quickly drained out into it and the park remaining free from floods. But if the Brahmaputra River rises above the flood level the excess water from this river bank flows into the Park through the rivers passing through it. The water from the Brahmaputra River thus enter from the park from Western side through the Diffaloo river and Mori-Diffaloo river. The Southern Boundary of the Park being a low-lying area is then flooded by the overtopping of the banks of the Moridiffaloo River. Thus the areas of the Park under the Baguri Block

are the first to be submerged during the flood. The bank of the Diffaloo River is comparatively higher and over topping of this bank takes place only when the flood level of Brahmaputra river rises further. As such the central portion of the park is the area which is submerged later. The Northern part of the park is submerged by the overflowing of the Brahmaputra River itself. From these discussion it is evident that the river Brahmaputra is the cause of flood in Kaziranga National Park.

With the gradual receding of water level in the Brahmaputra river the back flow of water in the rivers passing through the park stops and they start flowing to the Brahmaputra river again carrying the discharge and the excess water from the Park. Thus water from the submerged high lands clears up fast. But the low lying areas inside the Park from basins especially around the beels on the Southern Boundary on the western and central part remain under water for a considerable period even after the receding of the flood water from other places.

There are quite a number of chapories(river islands) of various sizes which have been formed by silt depositions. The main channel of the river goes on changing its course every year and the areas of maximum silt deposition and erosion also change accordingly. Thus the Northern Boundary of the park is very much unstable and is subjected to the ravages of the mighty Brahmaputra river. The aforementioned chapories are at present contiguous with the Northern Boundary of the park which are separated by shallow channels of the mighty river during the monsoon and joined through extensive sandy areas during the winter season. The beds of some of the beels and nallahs situated inside the park also are being silted up by the annual floods.

DISASTROUS STAGE OF FLOOD:

Excess water of the river Brahamputra drains through Kaziranga National Park and finds its way back to the same river with receding level of water in its channels. This drainage spreading in an area of 430 Sq. Km with various rivers, streams, channels, beels and vast areas covering grasslands and tree cover makes the water level to rise at various locations inside the park very slowly giving sufficient time to the animals finding their way to higher grounds inside the park and along the Karbi Anglong foothills. Once this stage is reached and animals are accumulated in large numbers on high grounds, any further sudden rise of water due to external factors, not relating to the normal drainage of Brahamputra flood water, may result into a disastrous conditions living large scale mortality of animals by drowning. These conditions were reflected in the high flood years of 1988 and 1998.

The reason for this situation was studied and it is found that breach in the embankment constructed on eastern side of the Kaziranga National Park along river Dhansiri from Dhansirimukh to Dhanbari results in flash flood in KNP where the water level rises rapidly to a great height all along southern and central portions of the Park.

EFFECT OF FLOOD ON KAZIRANGA NATIONAL PARK:

Annual flood in Kaziranga National Park has both positive and negative aspects. The flooding of the park is both necessary and beneficial for maintaining the ecology of the grasslands and forests though it has some adverse effect. The gradual rising of the water level and quick recession is no doubt beneficial. But floods of severe

intensity, which submerge the entire park for prolonged period, deprive the animals from food and shelter.

Positive effect:

1.Maintenance of vegetation status and soil formation:- The annual flood coupled with the annual burning of the grasslands are the two most important and major factors which influence the vegetation of the park. Flood is responsible for creating different site conditions and formations, preferred by different types of vegetation. The areas from where the flood water do not dry up completely have formed the swampy areas which support a different type of vegetation compared to the areas which are annually flooded but the water dries up quickly. Similarly there are waterlogged and other marshy areas which support a different type of vegetation. The soil formations of different sites are also influenced by the floodwater. In some area it has given rise to clayey soil by alluvial deposits and in some places it has arrested the progress of soil development by sand depositions creating different soil conditions preferred by different types of vegetation. Flood is one of the most important factors for maintaining the present vegetation status of the park and for arresting any further progress in the process of plant succession.

2. Breeding ground of fishes: As soon as the park is flooded the fishes found in the numerous beels and nallahs come out to lay eggs in the current of the floodwater. The fishes from these areas also go out to the Brahmaputra river alongwith the receding flood water. In this way Kaziranga serves as a breeding ground for the fishes and for replenishing the fish stock of the Brahmaputra river.

3.Clearing of water hyacinth: The receding flood waters wash away the water hyacinth from the beels, streams, nallahs etc. which grow into a very thick impenetrable mass depriving the birds such as ducks, pelicans etc. from foraging and hunting grounds.

4.Replenishment of beels: It also replenishes the dry beels and nallahs and add fertility to the soil by alluvial deposits and also maintain water quality through cycling.

Negative effect :

1.Casualty of animals: The influence of the annual flood on the Wildlife population of the park is also very important. The influence of flood on various species of wildlife of their physiological, behavioural and migratory habits is yet to be thoroughly investigated and studied. The distribution of various species of wild animal in the park with the change of season is most prominent during the flood. At the onset of monsoons the animals start moving from the low lying areas to higher grounds instinctively. As soon as the park is submerged by the incoming flood water the animals of the low lying Southern Boundary start migrating to the Karbi Anglong Hills and the animals of the central and Northern parts seek shelter in the forest highlands of the park. Some animals especially the deer living in the river islands along the Northern Boundary are washed away by the current of the turbulent Brahmaputra river. Some animals migrating to the Karbi Anglong Hills through the populated villages and across the Highway are killed by Poachers

and fast moving motor vehicles. Though all wild animals are expert swimmers some young animals do die due to drowning.

2.Shortage of fodder & malnutrition:-The favorite grazing grounds of the animals are around the beels consisting of shorter grasses. During high floods all such areas are submerged and only the tips of the tall coarse grasses and reeds remain out of water in other low lying areas. The tree forests areas, comparatively on higher grounds are devoid of any grass growth. As a result the grazing animals have to suffer from shortage of fodder. The Rhinoceros and the Buffaloes can however eat the submerged grasses who bring out mouthful of grasses from under the water and chew them above the water. When floodwater continues to submerge the areas for longer period the animals suffer from malnutrition and the cases of the occurrence of some starvation deaths cannot be ruled out. After the receding of the flood water the grasses which cannot stand prolonged submersion begin to die and rot. The effects of such shortages of food during the flood are reflected in the general health of the animals and the death of the older animals of various species immediately after the floods.

3.Migration of Animals: The forest dwellers like the Sambar, a browser probably do not suffer from food shortages as much as the grazers. The elephants and bisons , used to leave the park during the monsoon and migrate to the hills did not suffer much in the earlier years. But with the gradual opening of the hill slopes and the adjoining forests for human cultivation and settlement all such migration routes have been blocked now. Though a large number of elephants still cross over to the Karbi Anglong Hills, the to and fro movement of the bison has ceased altogether. As a result, herds of bison have been forced to stay in the park permanently. These are also observed taking shelter in the highlands during the floods.

4.Fawning of Hog deer: It has been observed that fawns of Hog deer are mostly born in Kaziranga during November and December whereas the peak birth period of Hog deer in other areas of the country is from March to May. Similarly the fawns of Swamp deer in Kaziranga are mostly born during the period of March and April whereas in Northern India most of the young are born in May and June. Whether flood has any bearing on these differences of rutting season and birth of the young ones requires to be studied and investigated in detail.

5.Disruption in communication: During the flood season communication between the various camps and with the Range Headquarters becomes very difficult. Some camps can be reached by boat by long detours and some camps can be reached with the help of both boat and elephants or only on foot, swimming across the channels and other low-lying areas. During such time patrolling is done mainly by boat. Many camps situated in strategic and low-lying areas of the park are submerged by flood water during high floods forcing the inmates to vacate their posts.

6.Damage to infrastructure: The floods generally causes considerable damage to the anti-poaching infrastructures viz. Roads, bridges, patrolling path, guard camps as well wildlife of the park. In the recent past the worst flood occurred in Kaziranga National Park in 1987, which was followed by another high flood in 1988. During 1998, the park experienced three successive waves high flood in June, August and September wrecked havoc to the Ant-poaching infrastructure of the park. The situation is further aggravated by the fact that the N.H.37 runs

almost parallel to the Southern Boundary of the park and large number of animals are run over or knocked down by vehicles on the road during the process of migration to natural high grounds. Besides, the natural highlands located on the south of the N.H.37, have also been opened up for cultivation and human habitation and fleeing animals also meet their doom in these areas due to human avarice.

Human-wild animal co-existence in Kaziranga:

There are 75 revenue villages along the southern boundary of the park and inhabited by more than 1 lakh people. Attitude of local people towards wild animal in Kaziranga is particularly interesting.

a) The area we know as Kaziranga is very fertile and was once inhabited by indigenous people till second invasion by Burmese (Myanmar) troupes in first part of nineteenth century. Then it was abandoned and gradually most part became tall grassland and woodland.
b) Earlier, people could extract some basic need like thatch, fish, fuel-wood etc.
c) Most people are marginal agriculturist and they need more fertile land.
d) Crop depredation is common and increasing.
e) Wild animals (some are potentially dangerous) come to homestead of local people during Monsoon and local people do not disturb unless it became inevitable. People protect distressed animal, help authority to take mitigation measures.
f) Human death and injury is not uncommon and increasing over the years. Retaliatory or malafide injury to wild animal caused by human is very rare.

LOCAL PEOPLE HAVE DEEP RESPECT AND SENTIMENTAL ATTACHMENT TO KAZIRANGA BECAUSE PEOPLE THINK KAZIRANGA AS THEIR OWN ANDTHEY FEEL PROUD TO RESIDE IN FRINGE AREAS OF THE PARK.

Human intervention:
Largely nature maintains wilderness of Kaziranga. Very little intervention is made like-

- Establishment of anti-poaching camps and habitation by armed guards.
- Bridges & culverts
- Roads & patrolling paths

Tourism in Kaziranga is confined to a very limited area, and as a strict management practice no saltlick, bait, artificial waterhole etc. are maintained within the Park boundaries.

9. KAZIRANGA NATIONAL PARK & INVOLVEMENT OF LOCAL PEOPLE:

There are 74 revenue villages situated adjacent to the KNP on its southern periphery. Total population of these villages would be about 50,000. These villagers have been directly and indirectly contributing greatly towards conservation of Kaziranga National Park. The Villagers have supported the Management Authority significantly in bringing the Protected Area (PA) to the present state of international fame over a period of one hundred years of scientific management of the park.

The Management Authority also has been trying to involve the villagers and other communities like Kaziranga Development and Jeep Safari Association, SAKU the local Hoteliers Association, PARIVESH SAMANNAY SAMITI, a senior and leading villager's Association constituted jointly with the representative of park authority and other local NGOs as force multiplier. 55 Eco Development Committees so far have been constituted and registered under Eastern Assam Wildlife Division Forest Development Agency as per the guidelines of GOI with an objective to build up capacity and provide empowerment for a sustainable socio-economic development. About 220 SHGs have already been constituted under the EDCs with similar objective. Further efforts are on to increase the number of such EDCs/SHG.

The Management Plan of Kaziranga National Park further envisages promotion of eco-tourism in the fringe villages of the park for better economic development of the local communities. This management approach is going to address the un-employment problem in the area remarkably in the near future.

How do the local people support conservation?

1.They help park authority in anti-poaching by providing information etc.

2.The members of Jeep Safari Association are involved as force multiplier to the management and help bringing awareness to the large number of tourists about dos and don'ts inside the park and in raising awareness about conservation of KNP. They are also instrumental in making the tourists interpret the bio-diversity of KNP properly and in making good publicity.

3.Flood is a regular phenomenon in Kaziranga National Park which occurs during the period July to October every year. The villagers support the park authority in protecting animals coming out of the PA for shelter and in rescue of affected animals.

4.Villagers co-operate with the authority while performing anti-depredation activity.

5.Villagers co-operate with the authority while carrying out vaccination etc. to the castles.

6.They get involved in all other activities done by the authority for raising awareness etc. whole heartedly.

10. THE GREEN WARRIORS OF KAZIRANGA:

This section has been devoted to highlight the tireless efforts and sacrifices of countless people who have made the Kaziranga National Park an unparalleled saga of a true wildlife conservation success of the century.

The names are listed in two categories, first all those who made the Kaziranga National Park actually happen, largely contributed during the early days of its constitution and formation. Then a List of Personnel & Staff who have either died or

been severely injured while on duty. The List has been shown at http://www.assamforest.in/knp-osc/linkpages.php?u=mr

Acknowledgement is also made of all staff of the National Park, including the Domestic Elephants, who have contributed towards this saga of success. Acknowledgement is also due to all the local people, village communities on the fringe, who have contributed immensely to the cause of conservation.

The names of those who scripted history during the early period of the Kaziranga National Park is given below:-

Name	Contribution	Year
J. C. Arbuthnot	The pioneer who heard the cry of the rhinos	1904
B. Fuller	Chief Commissioner, Assam, who suggested establishing an asylum for rhinos	
Major Gurdon	He surveyed the area for the proposed reserve	
Lady Curzon	Whose legendary love for wildlife helped the birth of Kaziranga	
Major A. Playfair	Forest Settlement Officer & DC, Sibsagar	1913
H Carter	Conservator of Forests, Eastern Assam. Banned hunting etc.	1908
W. F. L. Totton	Conservator of Forests, Eastern Assam. Declared the RF as Game Sanctuary	1916
P. D. Stracey	Ordered the Game Sanctuary to be named as Kaziranga Wildlife Sanctuary	1950
P. Barua	Chief Conservator of Forests. Iitiated the process of declaring a National park	1968
A. J. W. Milroy	He opened th Park for visitors	1938
Mahi Chandra Miri	1st Indian officer in Kaziranga	
E. P. Gee	He put the Kaziranga on the world map.	
J. Juan Spillet	He conducted the 1st animal census	
Padmashri Dr. Robin Banerjee	His movie called “Kaziranga” was of international acclaim	1961

11. THE RESOURCES ON KAZIRANGA NATIONAL PARK:

1.http://www.assamforest.in/NP_Sanctuaries/np_Kaziranga.php

2.http://www.assamforest.in/centenaryCelebration/index.htm

3.http://www.worldheritagekaziranga.com/

4.http://www.assamforest.in/knp-osc/index.php

At serial 4 above is a dedicated site for the n7w contest, and it will contain all the resources, including photographs of the Kaziranga National Park and other developments on the **New 7 Wonders of Nature Contest.**