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# The current state of rhino in Assam and threats in the 21st century

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**Additional key words:** poaching, habitat conservation

## Abstract

Assam, India, is one of the last remaining strongholds of the Indian rhino, an animal that is dependent on conservation because of threats from poaching and destruction of habitat. Field research was carried out in Assam to ascertain the current state of the rhino and to evaluate various threats. This paper highlights the latest status of rhino in Assam after the census of 1999, and the intense fieldwork carried out between January 1998 and September 2000. Poaching and floods are both named as major problems that greatly hamper conservation. The rhino population in Pabitora Wildlife Sanctuary had increased from 54 in 1987 to 74 in 1999; in Kaziranga National Park it increased from 1164 in 1993 to 1552 in 1999. However, in Orang National Park, the rhino population decreased from 97 in 1991 to only 46 in 1999, mainly because of unabated poaching. In the anti-poaching operation in Pabitora since November 1997, large numbers of poachers were arrested and arms and ammunition were recovered. Kaziranga witnessed the lowest poaching in 1999 with only 4 rhino killed by poachers, down from 8 in 1998. Anti-poaching staff of Kaziranga arrested 18 rhino poachers in 1999, a marked increase from 2 in 1998. To ensure the future of the rhino in Assam, forest anti-poaching staff need further government support. Habitat conservation and protection need to be given priority. Forest officials, the various collaborating NGOs and local people need to work together to conserve the rhino in the 21st century.

## Résumé

L'Etat d'Assam en Inde est un des derniers bastions du rhinocéros de l'Inde, un animal dont la survie dépend de la conservation en raison des menaces que représentent le braconnage et la destruction de l'habitat. On a effectué des recherches sur le terrain en Assam pour connaître le statut actuel du rhino et évaluer les différentes menaces qui le concernent. Cet article décrit le statut récent du rhino dans l'Assam après le recensement de 1999 et le travail de terrain intense entrepris entre janvier 1998 et septembre 2000. Tant le braconnage que les inondations sont reconnus comme des problèmes majeurs affectant grandement la conservation. La population de rhinos du Pabitora Wildlife Sanctuary a augmenté de 54 en 1987 à 74 en 1999. Au Parc National de Kaziranga, elle a augmenté de 1164 en 1993 à 1552 en 1999. Cependant, au Parc National d'Orang, la population de rhino a baissé de 97 en 1991 à 46 seulement en 1999 en raison, principalement, d'un braconnage permanent. Lors des opérations anti-braconnage menées à Pabitora depuis 1997, on a arrêté un grand nombre de braconniers et récupéré armes et munitions. Kaziranga a connu le plus faible taux de braconnage en 1999, avec seulement 4 rhinos tués par des braconniers, contre 8 en 1998. Le personnel anti-braconnage de Kaziranga a arrêté 18 braconniers de rhinos en 1999, deux de plus qu'en 1998. Pour assurer l'avenir du rhino en Assam, les efforts

incessants du staff anti-braconnage forestier doivent recevoir les encouragements et le soutien du gouvernement. La poursuite de la conservation et de la protection devrait être de la première importance pour garantir aux rhinos ce dont ils ont besoin pour survivre. Les responsables des forêts, les ONG et les populations locales doivent s'unir pour accomplir cette tâche ardue que sera la conservation du rhino au 21<sup>ème</sup> siècle.

**Mots clés supplémentaires:** braconnage, conservation des habitats

## Introduction

The state of Assam in India has successfully set aside areas for conserving and protecting the great Indian one-horned rhino, *Rhinoceros unicornis*, in its distribution range. Rhino numbers have increased from about 20 at the beginning of this century to 1700 animals in 2000. This success has been achieved through the dedicated efforts of the governments of Assam and India, supported by the local people. Vigne and Martin (1998), in updating information on the state of the rhino in Assam in 1997, put the number at 1406. This paper highlights the latest status of rhino in Assam, especially after the census of 1999, examines current threats to rhino from poaching, and looks at other factors. The paper also details statistics on the rhino population and poaching of rhinos from January 1998 to September 2000 in various protected areas of Assam. The study analyses the rhino census data of 1999 and details the intense fieldwork carried out between January 1998 and September 2000.

## Rhino status in Pabitora Wildlife Sanctuary

Although it is commonly believed that rhinos came to Pabitora only during the 1970s, history reveals that they have been present there and in the Mayong area since 1925. According to the local people, during the tenure of King Rohan Singha, a rhino calf was brought to the palace as a pet; however, after a few months it died from diarrhoea. Past records also show that 3

rhinos were found dead, at Raja Mayong, Sildubi and Barhampur. The villagers handed over the rhino horns to the Nagaon police.

According to the census conducted in March 1999 in the Pabitora Wildlife Sanctuary, there are 43 adult rhinos, which is 58.11% of the total rhino population; 12 subadults, 16.22%; and 19 calves, 25.68% (table 1). The 24 adult male rhinos make up 30.43% of the population, the 31 females 41.89%, and calves the balance. The male-to-female ratio stands at 1:1.29. Only 8 rhinos were found in 1971 when the government of Assam declared Pabitora a forest reserve. In a span of about 28 years, the rhino population in Pabitora increased from 8 to 74. However, poaching remains the major threat to these rhinos. Poachers have used various methods to kill rhinos; those used since 1987 are summarized in table 2.

From 1987 to March 2000, poachers killed 45 rhinos—22 males and 23 females, 21 inside the sanctuary and 24 outside it. Talukdar (1999) discussed factors affecting the status and conservation of rhinos in Pabitora. It has been monitored that 25 to 30 rhinos strayed out of the sanctuary during winter from November until March and raided crops of the adjacent villages. To solve this problem, the government of Assam expanded the area of Pabitora from 16 km<sup>2</sup> to 38.84 km<sup>2</sup> in 1999 to provide the rhinos with more grazing area. The success of the present range officer in Pabitora, who joined the

Table 1. Census figures of rhino in the Pabitora Wildlife Sanctuary

Year	Adult			Sub-adult			Calf	Total
	Male	Female	Not sexed	Male	Female	Not sexed		
1987	17	19	—	5	8	—	5	54
1993	18	21	1	1	2	2	11	56
1995	11	28	3	3	1	13	9	68
1999	17	26	—	7	5	—	19	74

Source: Forest Department, Assam

Table 2. Rhino poaching and anti-poaching results in Pabitora Wildlife Sanctuary

Year	Poached inside PWLS	Poached outside PWLS	Total poached	Horns recovered	Poacher arrested	Arms recovered	Ammunition recovered
1987	2p	nil	2	nil	1	1	nil
1988	1b	2b	3	nil	nil	nil	nil
1989	1e	1e, 2b	4	nil	nil	1	nil
1990	1b	1b	2	nil	nil	nil	nil
1991	nil	1b	1	nil	nil	nil	nil
1992	nil	2e, 1b	3	nil	nil	1	2
1993	1b	3b	4	nil	nil	nil	nil
1994	1e	3e	4	2	5	nil	nil
1995	2b	nil	2	nil	nil	nil	nil
1996	2e, 1b	2e	5	nil	nil	nil	nil
1997	2b	1b	3	nil	nil	nil	nil
1998	1e, 1b	2b	4	1	2	1	2
1999	3b	3e	6	1	28	20	102
2000*	2b	0	2	0	6	2	nil
	2p, 5e, 14b	11e, 13b	45	4	42	26	106

e = electrocution, b = bullet, p = poisoning, \* to September 2000

sanctuary in 1997 to control poaching and whose work has been recognized and lauded (Vigne and Martin 1998), is summarized in table 3.

Flood is another major problem that greatly hampers rhino conservation. During the flood of 1998, two rhino calves died in Pabitora. Flooding also increases silt deposition in the existing wetlands, making water scarce for the rhinos. This may have caused the rhinos to stray out of the sanctuary during winter, exposing themselves to danger from poachers. Livestock grazing inside the sanctuary is another

cause of concern for Pabitora. According to the Forest Department of Assam, more than 50% of the grasslands have degenerated because livestock have overgrazed it. To solve this problem, the Pabitora range officer has constructed a pound—a temporary enclosure where the livestock are confined to prevent them from grazing in the sanctuary. Now livestock owners are fined if their animals are found inside the sanctuary. During patrol, the forest guards herd the livestock that they find inside the sanctuary into the pound.

Table 3. Anti-poaching success in Pabitora

Date	Activity
1997: November–December	Arrested a poacher with handmade ammunition; arrested another inside the sanctuary.
1998: October	Recovered rhino horn from a rhino poacher; after questioning him, arrested 3 other poachers and took 4 muzzle-loading guns from them. Also recovered a .315 rifle, which had been seized in 1994 from the forest guard of Kamarpur Camp, Pabitora, whom the poachers had killed.
1999: January	Arrested 2 poachers and recovered 2 rifles, a .500 and a .303, with ammunition.
1999: May	Arrested 8 poachers and recovered 1 carbine, 1 self-loaded rifle, 3 rifles .500 bore, 5 muzzle-loading guns, 2 pistols, 2 single-barrel and 3 double-barrel shotguns, with huge amounts of ammunition.
1999: September	Arrested a poacher and recovered a double-barrel shotgun with ammunition.
2000: February	Led an anti-poaching party and arrested a poacher in Santipur village, near Pabitora, recovering a muzzle-loading gun from his house. One associate was arrested from Marigaon District and 2 were arrested in Kuthuri village, near Nelli. Recovered a .500-bore rifle.

Anti-poaching activities have been under the leadership of Range Officer Mrigen Barua

The author with a rhino calf rescued during flood at Kaziranga National Park (photo: Nilam Bora).



Poachers with a rhino horn arrested by the anti-poaching staff of Pabitora Wildlife Service (photo: Bibhab Kumar Talukdar).



Highway patrolling in Kaziranga to stop speeding vehicles from killing wildlife in floodtime (photo: Bibhab Kumar Talukdar).



Electric wire and gunpowder used to kill rhinos, recovered from poachers by Pabitora anti-poaching staff (photo: Bibhab Kumar Talukdar).



Legal orientation camp held in rhino-bearing protected areas of Assam, organized by the NGO Aaranyak for forest staff (photo: Bibhab Kumar Talukdar).

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## Rhino status in Orang National Park

The status of rhino in Orang has been of great concern of late because of the increased number of incidents of poaching. As a result of the conservation efforts made since Orang was declared a wildlife sanctuary in 1985, its rhino population increased from 65 in 1985 to 97 in 1991 (Talukdar 1995). However, Vigne and Martin (1998) showed that the number of poaching incidents increased during 1994 to 1997, when poachers killed 36 rhinos. The current study shows that from January 1998 to September 2000, 25 more rhinos were killed by poachers in Orang, resulting in only 46 rhinos counted during the 1999 rhino census there.

The local NGOs and officials from the forest department considered the seriousness of the situation and proposed that the Assam government upgrade the Orang Wildlife Sanctuary to a national park. In April 1999, the government finally declared Orang a national park. A number of NGOs, mainly Aaranyak, supported by the David Shepherd Conservation Foundation, have donated 18 walkie-talkies and 10 solar panels to Orang to enhance the anti-poaching efforts of the forest staff. The Rhino Foundation, supported by the US Fish and Wildlife Service, has donated two base stations for wireless communication and more walkie-talkies, thus strengthening the wireless network system to a great extent. A Gypsy 4-wheel-drive vehicle was donated to Orang by Care for the Wild, a local NGO, and Aaranyak and the David Shepherd Conservation Foundation donated a locally made metal speed boat to improve the mobility of the forest staff and allow them to carry out their duties effectively. The improved wireless network in Orang has led to fewer rhinos being poached—from 12 in 1998 to 7 in 1999 and 6 in 2000 by the end of September. The forest guards of Orang killed a poacher in an encounter in 1999.

Local NGOs in Assam like the Rhino Foundation, Aaranyak and Early Birds fully supported Orang during those years of heavy poaching, helping staff to bring the situation under control. Aaranyak organized two legal awareness camps for range officers, forest guards and officials, which the divisional forest officer also attended. An advocate of the Gauhati High Court who was also the Aaranyak legal consultant conducted the orientation camps. The participants learned various aspects of existing law

and law enforcement to protect endangered species.

The Rhino Foundation repaired the boat used in the anti-poaching efforts, and Early Birds held vaccination camps for the domestic cattle in the villages bordering the park to stop the transmission of the deadly anthrax from domestic cattle to wild rhinos. The Early Birds' plan of creating an immune belt to stop the spread of anthrax is aimed to have a long-term effect in reducing rhino death from the disease in the national park. Most deaths that are termed natural are caused by anthrax or related diseases.

Although flood is one of the major disasters in Kaziranga National Park and the Pabitora Wildlife Sanctuary, its impact on Orang National Park is negligible. Not a single rhino in Orang has been killed by flood. Although some areas of Orang are flooded, the higher northern terrace remains dry, and rhinos migrate to these areas when floodwaters are high.

Protection measures need to be improved to further strengthen the anti-poaching network and reduce rhino poaching in Orang. The NGOs continue to improve their support.

## Rhino status in Kaziranga National Park

The Kaziranga National Park (KNP) is one of the most successful stories of conservation of *Rhinoceros unicornis* in the world. From a population of a mere dozen rhinos in 1908, when the Kaziranga was declared a forest reserve, the population has grown to 1500 over 90 years of conservation. The rhino census conducted in Kaziranga in April 1999 recorded a population of 1552 compared with 1164 in 1993. The population figures by block that were recorded during the 1999 census are summarized in table 4.

The park (fig. 1) is situated on the floodplains of the river Brahmaputra. The terrain is flat, with a gentle slope running down from east to west. The soil is rich in alluvial deposit that the annual floods lay down. Park location on the floodplain eases the task of demarcating blocks for the rhino census. The census used the direct visual total count method. It was conducted over two days, 8 and 9 April 1999, because it was not possible to cover the entire area in a single day. The park was divided into eight major blocks, as listed in table 4. These blocks were further divided into compartments: the Baguri block into 12

Table 4. Rhino population at Kaziranga National Park during the 1999 census, by block

Block	Area (km <sup>2</sup> )	Adult			Sub-adult			Calf	Total
		Male	Female	Not sexed	Male	Female	Not sexed		
Baguri	74.30	224	212	45	31	34	18	120	684
Bhawani	72.90	45	41	13	3	7	2	21	132
Boralimora	31.00	7	12	3	1	1	–	8	32
Charighoria	55.50	29	28	4	3	1	1	11	77
Haldibari	48.00	88	121	3	6	9	13	44	284
Kaziranga	44.70	37	50	10	–	1	12	20	130
Panbari	51.50	42	26	10	2	4	8	13	105
Tamulipathar	51.40	26	26	8	3	1	3	13	80
Total	429.30	498	516	96	49	58	57	250	1524
Addition area	479.56	9	12	–	–	–	–	7	28
Grand total	908.86	507	528	96	49	58	57	257	1552

Source: Forest Department of Assam

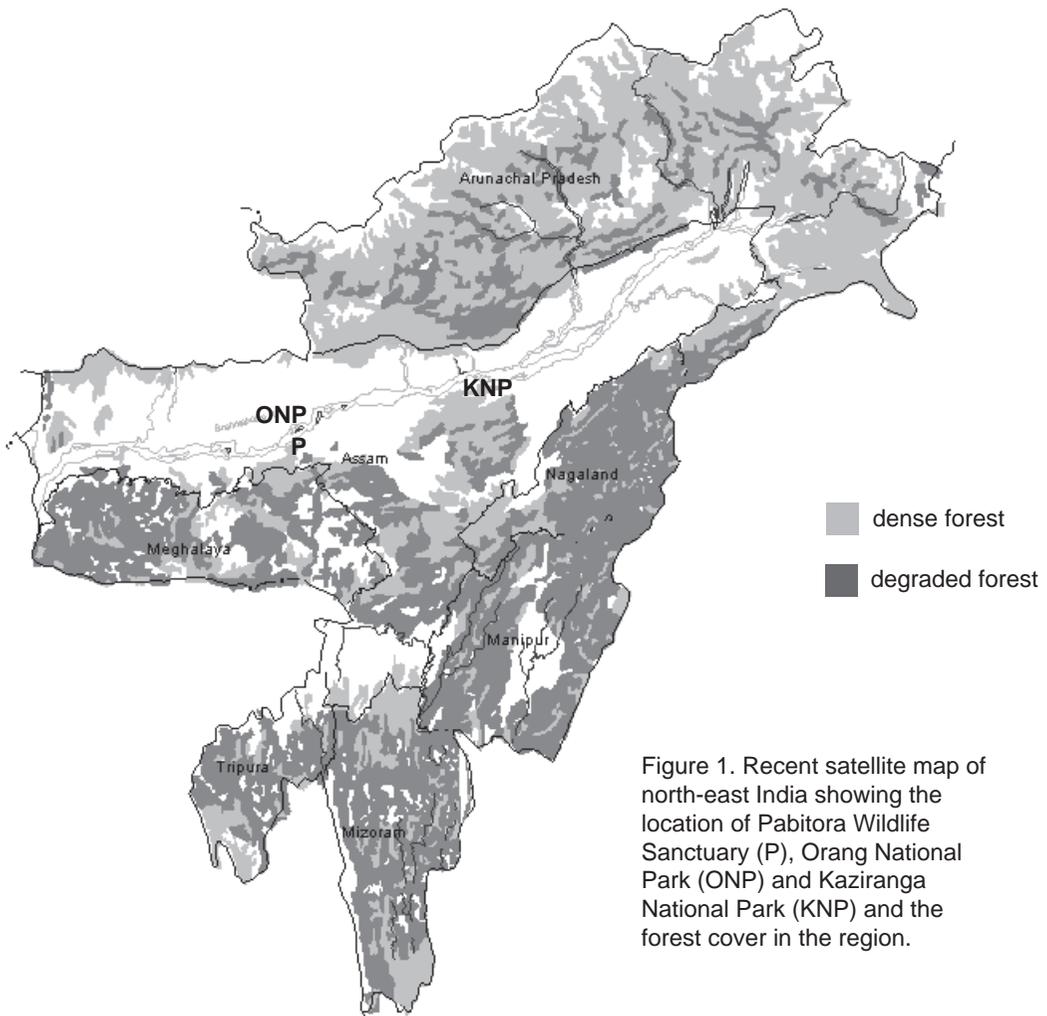


Figure 1. Recent satellite map of north-east India showing the location of Pabitora Wildlife Sanctuary (P), Orang National Park (ONP) and Kaziranga National Park (KNP) and the forest cover in the region.

compartments, the Bhawani, Charighoria, Haldibari, Kaziranga, Panbari, Tamulipathar blocks into 5 each, and the Boralimora block into 3, totaling 45 compartments in the eight blocks within the 429.3 km<sup>2</sup> of KNP. Eight more areas were included in the census: the first addition to KNP, Burapahar, with an area of 43.70 km<sup>2</sup>; the second addition, Sildubi, 47 km<sup>2</sup>; the third addition, Panbari, 0.69 km<sup>2</sup>; the fourth addition, Kanchanjuri, 0.89 km<sup>2</sup>; the fifth addition, 1.15 km<sup>2</sup>; the sixth addition, the shore areas of Brahmaputra, 376.05 km<sup>2</sup>; the Panbari Reserved Forest, 5.08 km<sup>2</sup>; and the Moriahola area in the northern part of KNP, 5.00 km<sup>2</sup>.

The census of 25 compartments was completed on the first day, 8 April; it included the first, second, third, fourth and fifth additions to KNP and the Panbari Reserved Forest. The remaining 20 compartments, the sixth addition and the Moriahola area were covered on the second day, 9 April. River Diffalu, which bisects the national park roughly into half, was taken as the dividing line for each day's count. The rhinos south of the river, including those in the addition areas, were counted on the day 1, and those north of the river were counted on day 2. Since the river is deep, with well-defined high banks, the chance of rhino crossing it on any one day was considered almost negligible.

The tall grass in KNP is burned every year as a management practice. In 1999, to assure a clear view for sighting the rhino, the grassland was burned before the April census was taken. After completing the pilot field survey, the Forest Department prepared a map of each compartment showing such features as the wetlands ('beels'), channels ('nallahs'), roads and patrolling paths. The starting point and the end point for the census in each compartment were clearly shown to avoid any confusion the enumerators might have in identifying their respective areas of census. Each enumeration party consisted of one enumerator in charge of the party; one assistant

enumerator, usually from the media or an NGO; one guide, usually a forester or a forest guard with thorough knowledge of the area; and a mahut with an elephant. The park has four rangers.

The rhino population as recorded in the 1999 rhino census operation is shown in table 5.

Rhinos in KNP die from natural causes or poaching. The natural deaths come from floods, predation, old age or disease. Death by poaching comes from gunshot, pit poaching, electrocution or poisoning. The total death of rhinos in KNP in six years, between January 1993 and December 1998, stands at 462; 335 animals died of natural causes and 127 died from poaching. That means an average of 56 rhinos died a natural death each year during the six-year period of 1993 to 1996 and 21 died from poaching. Thus the average net annual mortality from 1993 until 1998 is 4.11% from natural death and 1.55% from poaching.

From January 1998 to September 2000, poachers killed 16 rhinos (table 6), but a fairly large number of poachers have been arrested or killed and firearms and ammunition seized. In 1999, poachers killed only

Table 5. Rhino population in Kaziranga National Park as recorded during the 1999 census

Range	Block	Rhino	
		no.	%
Western Range (Banguri)	Baguri	684	
	Bhawani (part)	53	47.55
	4th addition area	1	
	Total	738	
Central Range (Kohora)	Bhawani (part)	79	
	Charighoria	77	44.27
	Haldibari	284	
	Kaziranga	130	
	Panbari	105	
	2nd addition area	12	
Total	687		
Eastern Range (Agoratoli)	Boralimora	32	
	Tamulipathar	80	7.22
	Total	112	
Burapahar Range	1st addition area	9	
	6th addition area	5	0.90
	Total	14	
Bokakhat Beat	Moriahola	1	0.06
Grand total		1552	100.00

Table 6. Details of rhino poaching and encounters in Kaziranga National Park, January 1998 to September 2000

Year	Rhino poached	Poachers killed	Poachers arrested	Arms recovered	Ammunition recovered
1998	8	3	2	2	435
1999	4	2	18	5	0
2000	4	0	15	na	na

4 rhinos, which is an all-time low for the history of Kaziranga since it became a national park in 1974.

Flood is another threat to the rhino population, especially the calves. In the devastating flood of 1998 about 39 rhinos were drowned in KNP, of which 18 were adult, 5 subadult and 16 calves. In the 1988 flood also, 38 rhinos were drowned of which 9 were adult, 10 subadult and 19 calves. Some of the KNP rhinos were found migrating to the adjoining hills of Karbi-Anglong through certain paths, but most of the rhinos remained inside the park. They were found taking shelter on the high land within the park in the flood of 1998. After the flood of 1998, the Forest Department and the Indian Army constructed more highlands to reduce the loss of wildlife, particularly the rhinos, because of high floods. It is hoped that in future floods the newly constructed highlands will offer some relief to the wildlife.

### Threats to rhino in Assam in the 21st century

Conserving and protecting rhino in the 21st century in Assam will depend on continued relentless efforts by the forest staff to save the rhinos from poachers. Poaching will remain a major threat to the rhino population. Therefore, anti-poaching efforts have to be improved and maintained. Receiving information in advance on the movement of poachers and wildlife smugglers is extremely crucial in apprehending illegal wildlife traders and disrupting their activities. It is therefore imperative that clandestine channels of information are developed and a collection system is maintained to assist anti-poaching staff. In addition to the hazards caused by rhino poachers, natural floods and diseases, the state of Assam is likely to experience a further increase in human population. Weakly protected rhino sanctuaries would easily fall prey to encroachers, especially around the Brahmaputra Valley. Unless the government of Assam expands its

rhino sanctuaries in the next two years, the increased human population pressure will threaten the future of the rhino living in the few existing pockets like Kaziranga, Orang, Pabitora and Manas.

The six additions to KNP cover an area of 430 km<sup>2</sup>. Some were handed over to KNP last year, but the government has not yet handed over the sixth addition, which covers an area of around 376 km<sup>2</sup>. The expanded area to Pabitora Sanctuary also urgently needs to be handed over to provide more habitat for the increasing population of rhinos in Pabitora. It will also reduce the incidence of rhinos straying out of the sanctuary because habitat and food are in short supply. A number of water bodies in the rhino-bearing areas in Assam have shrunk in size and depth because of the siltation brought about by flooding. It is therefore imperative that these water bodies be desilted to maintain the wetland habitats for the rhinos. The future of the rhino will depend not only on ecological and natural factors but also on sociopolitical factors. The need is urgent to enhance the existing intelligence network and to initiate social welfare for the fringe villages with the aim of controlling village population explosion. If zero population growth could be achieved in the villages at the fringes of the rhino-bearing protected areas, the conflict between villagers and rhinos would be reduced. The Forest Department and the NGOs need to work together to achieve this uphill task.

Hence challenges before us are many, and only coordinated efforts will help us achieve our task of rhino conservation during the 21st century. Working in isolation will create more problems than solutions. With dedicated efforts, the Forest Department, which has nearly a hundred year of experience in rhino conservation, and with support from the NGOs and local people, the challenging task of conserving rhinos in Assam for next hundred years seems not a distant cry. Periodic evaluation of the successes and the failures of rhino conservation in various parts of Assam by the Forest Department and the NGOs will certainly make action at the appropriate time more possible.

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