



Subadult male rhino (Photo: Bhattacharya)

THE STATUS OF THE KAZIRANGA RHINO POPULATION

by Amal Bhattacharya

Introduction

Kaziranga (93° 30'E, 26° 30'N) has been considered to be the safest homeland of the Great Indian one horned rhinoceros (*R. unicornis* L.) for many years. The story of the Kaziranga rhinos is a landmark in India's conservation history.

In the nineteenth century, Assam's rhinos had been hunted almost to extinction when the plains were cleared for tea plantations. By 1908, when the hunting of rhinos was declared illegal, only a dozen rhinos were left there. But the first effective measures were taken by declaring it as "Kaziranga Wildlife Sanctuary" in 1932. At the Mysore Conference (Indian Board for Wildlife, 1952), the executive committee of the Indian Board for Wildlife first recommended to make it a National Park by creating a buffer zone surrounding the area. According to that recommendation, the Assam State Government, by a gazette notification, soon after duly created such a buffer zone surrounding Kaziranga, which low-

ered the poaching incidences significantly (Gee, 1955). The years that followed recorded the successful management efforts of the forest officials and staffs. This excellent rhino habitat was declared a National Park w.e.f. 1st January, 1974.

Study Area

Kaziranga enjoys a great natural boundary, the river Brahmaputra, along its north side which becomes furious from June to October every year. During my first visit in 1984, I saw much of the lower lying grounds under water even in late November. Numerous tributaries of the river Brahmaputra flow through the Park, creating many permanent 'bheels' or lakes. The soils are all alluvial deposits of the Brahmaputra and its branches. The vegetation is mixed grasslands and riverine woodlands, with grasslands predominating in the west. Tall grasses are common on higher grounds and short grasses grow on the lower grounds surrounding the

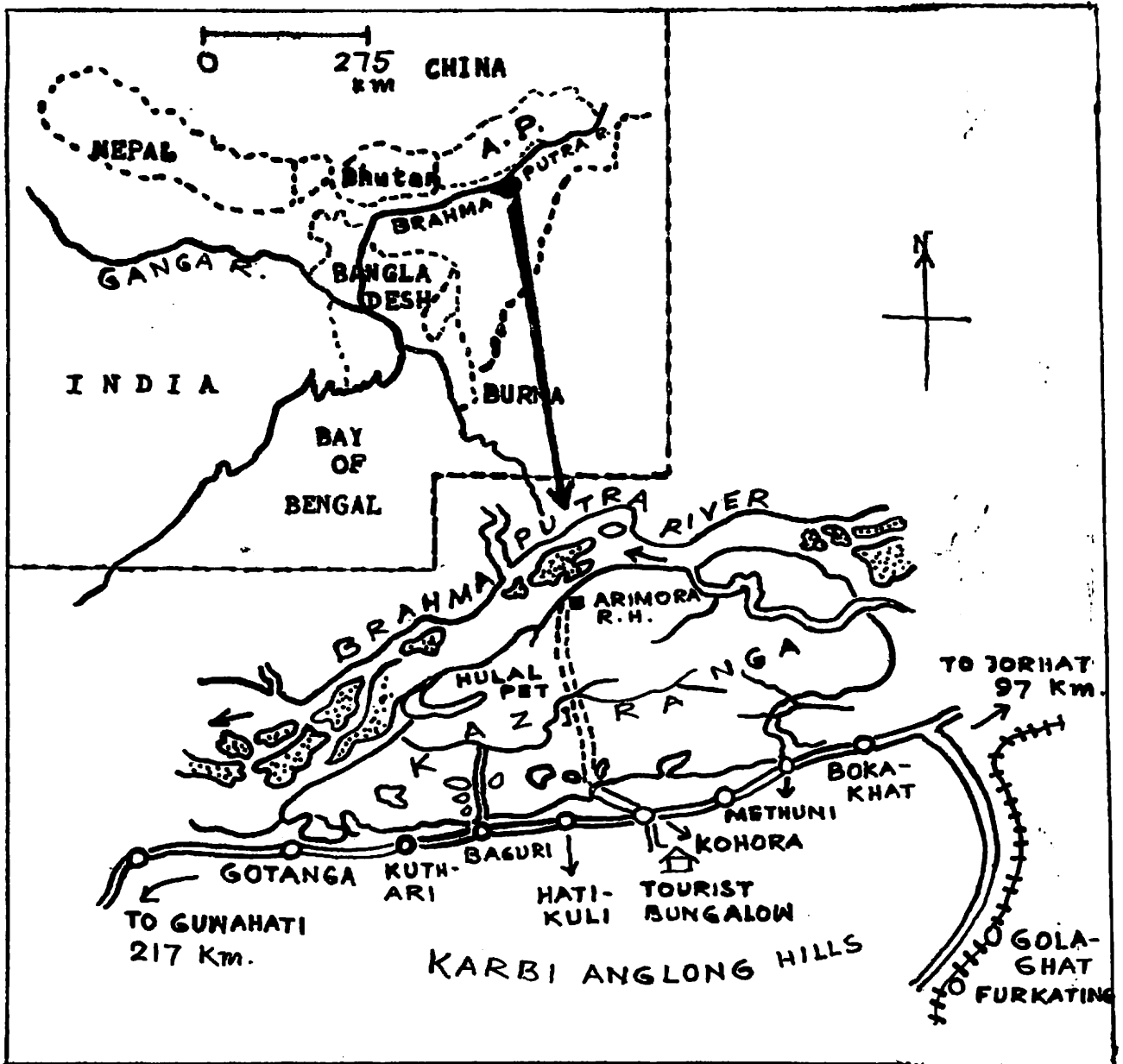


Fig. 1. Map of Kaziranga National Park showing its position with surroundings.

lakes. The climate is monsoonal.

Heavy rains from June to September cause flooding every year, pushing the animals in the park to drier lands in the south. During the dry season the tall grassland is burnt by the Park staff to encourage the growth of young sprouts of lush green grasses. Both fire and floods have helped to maintain the Park's primitiveness (Spillet, 1966).

The National Park extends in an east-west direction lengthwise and spreads over two neighbouring districts, Nawgong and Shib-Sagar. The southern boundary is guarded by the Assam Trunk Road where frequent patrolling is done by the Kaziranga Forest Department.

The management of the Park is the responsibility of the Forest Department. The National Park occupies an area of 430 km². There is a good communication network between the camps (guard posts), beats and range offices. Presently there are 104 camps for 400 forest guards, 40 elephants and a few four-wheel drive vehicles, compared to 183 men for 34 guard posts, twenty elephants and a few jeeps in 1974 (Laurie, 1978). Speedboats are new inclusions in the park for use in the rainy season. Most areas can be visited by four-wheel drive jeep during the dry season.

The forest officials report that in spite of the above-listed facilities available to them, the numbers of forest guards and elephants are insufficient for such a large area. Kaziranga requires at least double the number of forest guards and elephants for better protection and management (Bhowmick, 1992).

Kaziranga in Recent Times

Poaching has been considerably reduced at Kaziranga in recent years. It is known from the official census report that there are presently 1,129 rhinos in that area, which is forty-nine more than in the last census report of 1984 (Govt. of Assam, CCF(WL), 1992). The greatest threats to the rhinos' survival are floods and poaching (Sharma, 1984; Lahan, 1984). In 1988, severe flooding of the Brahmaputra river took the lives of 33 rhinos; on the other hand, poaching caused the death of 55 rhinos. Most of the horns were removed by the poachers (Bhowmick, 1992).

In spite of these disasters, the rhinos have prevailed there. This is partly because of the activities by the ULFA (United Liberation Front of Assam) mili-

tants, who in the later years of the last decade, emerged as a new threatening power inside Assam. The ULFA activists were well aware of the illicit tradings in rhino horn and they began to take stern action against the known unscrupulous traders from the early months of 1990. In fact, in the closing months of 1990, ULFA leaders declared that whoever destroyed the nature of Assam, would be convicted and severely penalized. After this declaration the poachers and illegal traders became panic stricken. This support encouraged forest guards and officials. The forest guards killed 9 and 2 poachers in 1991 and in January 1992 respectively with their less sophisticated weapons (Bhowmick, 1992).

The other side of the coin is brighter. People around the world are beginning to realise the need to bring a halt to the trade in rhino products. Since 1982, the WWF has campaigned against it. In 1985, a conservation scheme was projected by that organization to exert pressure on governments in East and Southeast Asia to ban the sale of rhino horn (Vigne and Martin, 1986). Doctors and pharmacists were urged to introduce their patients to substitutes like bovine horn.

The results have been encouraging. Many South and Southeast Asian Governments have decided to ban the trade in rhino products (Vigne and Martin, 1986). The sales of rhino horn in East Asia have dropped over the past decade, creating hopes that Indian rhinos may after all be able to survive in some of their natural habitats like Kaziranga.

Results and Discussions

There was a steady increase in the Kaziranga rhino population from 1966 to 1978. From 1978 onwards, the rate of increase slowed down, and during recent years, i.e. after 1984, it has stabilized. The annual rate of increase in rhino numbers has come down from 45/48 (1966-'72 & 1972-'78 respectively) to only seven (1984-'91) in spite of having new recruitments or births.

It can be seen from Table I that during the mid seventies, i.e. from 1972-'78 (in between the 2nd and 3rd censuses) altogether 212 rhinos lost their lives due to various reasons. Almost half (109) of the deaths were natural. Despite this disaster, the annual rate of increase was the highest ever recorded (Table II) and a steady increase in their population was noticed during that

Table 1: Loss of rhino due to various reasons during the period 1972-78 at Kaziranga

Year	Poaching	Fighting	Disease	Natural	Accident	Unknown	Tiger Predation	Floods	Total
1972	-	1	1	15	-	-	4	-	20
1973	3	1	10	21	-	7	16	4	62
1974	3	-	-	11	1	1	6	1	23
1975	5	2	-	27	-	-	5	-	39
1976	1	1	-	12	1	-	7	-	22
1977	-	1	1	20	1	1	12	1	37
1978 (up to March)	-	-	-	3	-	2	4	-	9
	12	6	11	109	3	11	54	6	212

Table 2: Annual rate of population increase of rhinoceros from 1966-1991

Year Range	Actual Number increased/yr.
1966 - 1972	45
1972 - 1978	48
1978 - 1984	20
1984 - 1991	7

Table 3: Deaths of rhino owing to flood and poaching only at Kaziranga from 1988-1991

Year	Poaching	Flood	Total
1988	10	33	43
1989	12	-	12
1990	28	-	28
1991	19	-	19
	69	33	102

period. In contrast, during the last four years (1988-'91), the lives of 102 rhinos have so far been taken by floods and poachers, apart from deaths due to other causes i.e. disease, fights, tiger predation, etc. (Table III).

Thus, it seems that despite an almost constant death rate in recent years (1984-'91) compared to that of previous years (1972-'78), the rate of increase of the rhino population has reached its lowest limit. Is it due to a decrease in conception among the adult female rhinos?

The rhinos generally give birth to a single calf at 3 to 4 year intervals after a gestation period of 16 months. The age of first reproduction is 3^{1/2} years. So an adult female can give birth to a maximum of 9 calves in her life time, taking a maximum 44 years as the expected life span. Data from chronological census reports (1966-'91) shows that the age composition consists of nearly 70% adults, 18% calves, and 12% juveniles (Govt. of Assam, CCF(WL), 1984). This indicates a stable population including a balanced recruitment, which is there at the present time. A similar stable recruitment rate was found among the African black rhinoceros (*Diceros bicornis* L.) population in MasaiMara Game Reserve (Mukinya, 1973). Out of the 70% adult population, almost half were females. The annual birth rate was about 15% of the total adult female population, which remained steady up to 1978, then fell to 5.3% in 1984 and further dropped to 1.8% in 1991.

Why has the rate of new recruitment decreased? It may be due to the fact that their population is rapidly reaching the carrying capacity limit. New recruitments may add a little to the existing population of rhinos in the near future. That is why the exponential growth curve of the rhino population which prevailed up to the early 1980s flattened out in later years. It appears that up to 1980 there were no limiting factors, but in the later years a crowding effect became predominant due to overuse of pasture, limited resting and moving places, competition for cover, etc. The population increases at a slower rate at first (establishment or positive acceleration phase), then more rapidly (perhaps approaching a logarithmic phase); but soon it slows down gradually as the environmental resistance increases percentage-wise (the negative acceleration phase), until a more or less equilibrium is reached and maintained (Odum, 1971). Here, at Kaziranga, it took 58 years to reach the population level of 400 from the original 12 rhinos (positive acceleration phase). In the next 12 years (1966-'78) it doubled (logarithmic phase) and the period from 1978 onwards is considered as the negative acceleration phase.

The nature of the growth curve shows that the number of rhinos at Kaziranga should be around 1,200 in that 430km² area consisting of 66% grassland, 28% forest and 6% 'bheels' and marshy land (Govt. of Assam, CCF(WL), 1984) unless there are heavy setbacks like epidemics, floods, poaching, tiger predation, etc. in Kaziranga in the near future.

I would like to make special mention here about tiger predation on rhino calves. The recent census report of 1991 shows that the tiger's usual prey, i.e. hogdeers, are decreasing in number at an alarming rate. During the last 7 years the hog deer population has dropped down to only 2,400 in 1991, from 10,000 in 1984. This may be evidence that tigers are increasing in number. It may be apprehended that this sudden drop in the deer population may cause frequent tiger predation on rhino calves in the forthcoming years.

Conclusion

From the above discussions, it can be concluded here that, at present, a negative acceleration phase is going on at Kaziranga in the context of the rhino population. Further, the rhino population may not reach its asymptote level (i.e. 1,200) within this century because of the various above-mentioned reasons. Also, the tigers may be less likely to survive in the near future in as healthy a stock as they are today if there is not sufficient food. Rhino mothers take particular care of their calves. The lower the age of the calves, the higher the parental care taken by the mothers. This may lead to frequent interspecific confrontations in the years to come.

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Adult female rhino (Photo: Bhattacharya)