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# FLOOD HAVOC IN KAZIRANGA

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## RESUME

Le parc national de Kaziranga, au nord - est de l'Inde est bien connu comme abritant La plus importante population du rhino indien, *Rhinoceros unicornis* dont les effectifs représentent 60% de la population de l'espèce au niveau mondial (Choudhury, 1985 et 1997). Le Parc couvre une superficie de 473km<sup>2</sup> (429km<sup>2</sup> de superficie initiale, et 44km<sup>2</sup>de superficie additionnelle en 1996) de plaines inondables de la rivière Brahmaputra. La population des rhinos est estimée à environ 1100 individus. Situé sur la plaine inondable d'une importante rivière, le Parc tout entier est soumis à des inondations annuelles. Cependant, l'eau atteint occasionnellement des niveaux très élevés, entraînant un envahissement de la majorité du Parc par les eaux d'inondation.

En 1988, une inondation dévastatrice a ravagé le Parc, causant une perte importante de faune et de flore. Une inondation similaire à celle de 1988 s'est produite en 1998, causant la mort d'un grand nombre d'espèces dont le rhino indien. Pour évaluer la situation sur le terrain, le Parc a été visité en Septembre (pendant l'inondation), Octobre et Décembre 1998 (après l'inondation). Ce qui est présenté dans cet article, est un rapport sur les inondations et des mesures suggérées pour remédier à la situation.

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## INTRODUCTION

The Kaziranga National Park in Assam, north-eastern India, is well known for having the largest population of the India rhino *Rhinoceros unicornis*, accounting for about 60% of the species' world population (Choudhury, 1985 and 1997). The Park covers an area of 473km<sup>2</sup> (429km<sup>2</sup> original area and 44km<sup>2</sup> added as first addition in 1996) of the floodplains of the Brahmaputra river. The estimated rhino population is approximately 1,100. Being located on the floodplain of a major river, the entire Park is subjected to annual flooding. Occasionally the water level rises to abnormally high levels, causing the majority of the Park to become submerged under flood water.

In 1988, a devastating flood ravaged the Park, causing extensive loss of flora and fauna. A similar flood occurred in 1998, resulting in the death of a large number of species including the Indian rhino. To assess the situation in the field, the Park was visited in September (during the floods), October and December 1998 (post-flood). Presented in this paper is a report on the floods and suggested remedial measures.

## THE FLOODS OF 1998

The 1998 floods came in three different phases. The first phase started on 25 June and continued until 3 August, and wildlife populations took shelter in the

highlands with negligible casualties. The water level receded slightly in July with ups and downs. The second phase began on 13 August and continued until 29 August 1998. After this phase, the water level receded to slightly lower levels than those of the first phase. The third and worst phase started on 3 September. The water level began rising slowly on 31 August, with peak flood water levels being reached on 5, 6 and the morning of 7 September, which caused the most harm to wildlife populations. The water level started receding slowly from the highest point on 7 September and by 10 September most of the highlands and major roads inside the Park had reappeared. By 12 September the water level had subsided by more than a metre. During the worst stages of the flood, the bulk of the highlands were submerged and more than half the anti-poaching camps were damaged. The road network was breached in places and most of the wooden bridges were also damaged.

The third phase of the 1998 flood was slightly lower than 1988 levels at the 'Second tower' near Mihimukh, although it was reported that in some areas, eg. Agorotoli, the water level exceeded 1988 levels by a few centimetres. National highway (NH) 37 was flooded at four or five places between Kohora and Burhapahar. The road was closed for vehicular traffic from the evening of 5 September to the morning of 7 September.

As is usual during flood periods, wildlife took shelter on

Photo Credit: Anwaruddin Choudhury



Carcass of a rhino (*Rhinoceros unicornis*) that died due to drowning in Kahora range area.

the artificial high grounds (totaling 69) and roads, while a few moved towards Kukurakata Hill RF, Burhapahar hillock, Panbari RF, Bagser RF, the northern range of Karbi Plateau and the adjacent tea, coffee and rubber gardens. But during peak days of the flood in the third phase, when almost all the artificial high grounds were underwater (as well as the entire Park), the majority of wildlife populations moved out of the Park in a panicked state. During this time, the wildlife had to cross the busy NH 37 as well as pass through human settlements. This resulted in large-scale loss of wildlife which were either hit by vehicles or killed by the villagers and plantation labourers. In northern areas of the Park, some animals tried to cross the

Brahmaputra river but were mostly drowned or killed by poachers. Species such as the Hog deer *Axis porcinus* suffered most, while species such as the Swamp deer *Cervus duvauceli*, Wild buffalo *Bubalus arnee* and rhinos could remain on partly submerged roads and high roads for a few days. The carnivores were not affected as they moved into trees and shrubs.

Rhinos that drowned are listed in Table 1, and those rhinos that died of other causes during the flood are listed in Table 2. The estimated damage to infrastructure of the Park is approximately US\$385,000 and the details are in Table 3.

Table 1. The casualty of Indian rhinos during the floods (all drowning) of 1998 (between 1 June and 30 September).

1st phase	2nd phase	3rd phase	Total
5	5	29	39

Note: One rhino calf was rescued

Table 2. The casualty of Indian rhinos due to other causes during the floods of 1998 (between 1 June and 30 September).

Infighting	Killed by tiger	Poaching	Old age	Total
1	1	8	8	18

Note: Of the eight rhinos poached, only one incident was inside the Park.

Table 3. The estimated loss/damage of infrastructure during the floods of 1998 (between 1 June and 30 September).

Roads and patrolling paths - 200km	\$119,050
Bridges -25	\$112,380
Camps-64	\$76,190
Raised platforms - 30	\$71,430
Country-boats & ferry boats -70	\$5,950
Total	\$385,00

Source: Forest Department, Assam.

## DISCUSSION

Although floods often occur in Kaziranga, wildlife populations are still adversely affected due to the lack of sufficient high ground because of the clearing of natural vegetation in the fringe areas with slightly higher grounds for human settlement and cultivation and cash crop plantations (mainly tea, also coffee and rubber). The drowning of 39 highly endangered rhinos is an indication of loss. The death of a large number of Hog deer and other prey species also reduces the prey base for the Tiger *Panthera tigris*, thus increasing the

possibility of an upward swing in Tiger predation of rhino calves. Due to prolonged submergence, most of the grassland area was damaged, and either the grasses have died or were covered with mud, thus making it difficult for the animals to feed for about a month. The main advantages of floods are clearing of wetlands or weeds such as the exotic water hyacinth, situation in the grasslands (which provide nutrients) and accretion of new *chapories* (riverine islets and tracts).

Construction of more high grounds inside the National Park seems to be the only viable alternative. Declaration

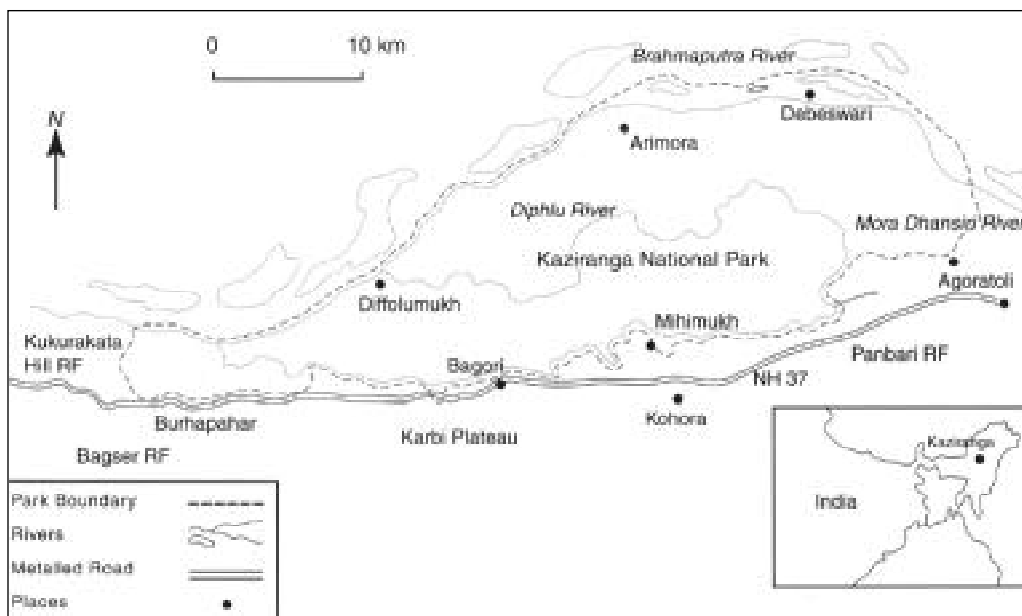


Figure 1. Map of Kaziranga National Park showing the places mentioned in the text

Photo Credit: Anwaruddin Choudhury



*Kaziranga flooded, with almost the entire Park under water during the last phase.*

Photo Credit: Anwaruddin Choudhury



*A damaged bridge with Mr D. Boro, the Range Officer in central Kaziranga.*

of protected areas in the Karbi Plateau will help protect a large number of marooned wildlife in future, but it is impossible for all wildlife to move into this area, especially those in the northern area of the Park. The Indian army has constructed ten high grounds in Burhapahra range area while the Karbi Anglong Autonomous Council has agreed to set up a wildlife sanctuary. The Government of Assam has released some funds for repair of roads and bridges, while NGOs, especially The Rhino Foundation based at Guwahati, provided some immediate post-flood needs such as tarpaulins and hurricane lanterns for the anti-poaching camps, and batteries for torches for night patrolling.

## RECOMMENDATIONS

1. More high grounds should be constructed in the northern areas, between Diffolumukh and Debeswari.
2. The movement of vehicular traffic along the NH 37 should be regulated during the floods, especially at night.
3. Strong measures should be taken to check erosion by the Brahmaputra River in Agoratoli range area. An estimated 20km<sup>2</sup> has eroded away during the last few decades (Choudhury, 1997).