

Status Paper of Royal Bardia National Park

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Abstract

Royal Bardia National Park is the biggest national park (968 sq.km) of the lowland *Terai* of Nepal. Tall floodplain grasslands created by the Geruwa, Babai, and Orai river system, and phantas—previously cultivated and re-vegetated short grasslands—are the main grasslands of the park. In terms of size, there are three major grasslands: Bagaura, Khauraha, and Lamkauli. Issuing of grass-cutting permits has been continued to provide twin benefits: socio-cultural and economic benefits to the local community, and a management tool for the conservation of biodiversity. Allowing cutting of grass has also helped to minimise park-people conflicts. All these grasslands are being gradually encroached by tree species and invaded by unpalatable species. Grassland in the Babai valley is also decreasing in area as a result of succession. *Bombax* and acacia have almost covered the valley. Several short-term research studies have been carried out to look at different aspects of the grassland in the park. Management intervention by the park has been done to maintain these grasslands by incorporating traditional practices adopted by the local community and recommendations of researchers. However, concrete management intervention and a system of continuous monitoring of the impact of intervention is essential for long-term management of the grassland ecosystem.

Introduction

Royal Bardia National Park (RBNP) is the biggest national park (968 sq.km) of the lowland *Terai* of Nepal. In 1969 part of the area was established as a Royal Hunting Reserve. In 1976 it was gazetted as the Royal Bardia Wildlife Reserve (area 348 sq.km). Later, in 1984, the area was extended to include the Babai valley in the north-east, and renamed the Royal Bardia National Park.

Seven major vegetation types—sal forest, khair-sisso, moist riverine forest, mixed hardwood forest, wooded grassland, phantas, and floodplain grassland—have provided suitable habitat for more than 38 species of mammals (including 9 endangered), 25 reptiles, 60 fishes, and more than 400 species of birds. The Babai valley and Karnali flood plains are prime habitat for the reintroduced greater one-horned rhinoceros and migratory wild elephants.

RBNP is surrounded by 25 village development committee areas (VDCs) of which 17 are within the buffer zone of the park. Ninety thousand people of 11,000 households reside in the buffer zone. After the protected area was established, access to grass and grass products was restricted. Authorised cutting of grass started again in 1983 (Table 8)

Grasslands: Status and Use

The tall floodplain grasslands, created by the Geruwa, Babai, and Orai river system are dominated by *Saccharum spontaneum*, *S. bangalensis*, *Arundo*

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donax, and *Phragmites karka*. Phantas, previously cultivated and re-vegetated short grassland, are dominated by *Imperata cylindrica* and *Vetiveria zizanioides*. There are three main phantas in RBNP namely Khauraha (Upper Khauraha 0.95 sq.km, and Lower Khauraha, 0.34 sq.km), Bagaura (Upper Bagaura 0.59 sq.km and Lower Bagaura 0.34 sq.km) and Lamkauli (1.11 sq.km). Mansuri Phanta, north of Lamkauli Phanta, was also a grassland upto 1976 but has converted to forest in the course of succession.

Traditionally, people collected thatch grass, binding material, and reeds from the area that is now protected. Free access was

refused in 1976 when the area was declared the Royal Bardia Wildlife Reserve. However, recognising the traditional dependence of local people on park resources for subsistence living, a process of issuing permits once a year has now been introduced so that local people can have access to grass and grass products.

Grass is an important natural resource that plays an integral role in the subsistence lifestyle. People use it for different purposes like fodder; raw material for household goods like rope, mats, storage baskets, and vessels; and fencing and thatching. Villagers generally collect thatch grass (primarily *Imperata cylindrica*), reeds (primarily the canes of tall grass like *Narenga porphyrocoma*, *Phragmites karka*, and *Aurundo donax*), and binding materials (*Eulaliopsis binnata* and *Desmostachya binnata*). Tharu people have traditionally used a wider range of products than other ethnic groups.

Harvesting of grass by local people has helped to provide forage for grazing ungulates and probably to maintain the grasslands. Thus, cutting of grass has twin benefits: socio-cultural and economic benefits for the local community, and conservation of biodiversity. Further, permission to cut grass has helped to reduce park-people conflict. In 1994, the duration of harvest was reduced to 10 days. However, the number of grass-cutting permits has doubled within the last ten years. The loss of grassland outside the protected area and the increase in population probably led to the increase in the number of thatch permits up to 1998. The reason for the sudden increase in 1999 is unclear, however, because since 1997 a few villages have a protected buffer zone and are self sufficient for their forage requirements. It remains to be discovered whether the increasing number of grass-cutting permits has increased the biomass harvest.

Table 8. Number of grass-cutting permits issued annually

Year	Number of permits
1983	21,081
1984	25,565
1985	27,824
1986	30,568
1987	29,161
1988	30,241
1989	33,142
1990	38,117
1991	37,962
1992	41,413
1993	na
1994	45,598
1995	43,539
1996	48,923
1997	50,838
1998	49,508
1999	57,255

Grassland Management Activities

In order to maintain the existing grasslands, RBNP has introduced some management practices based on traditional knowledge and recommendations made by researchers.

Traditional Practice

Grass cutting and fire

Bush firing has been adopted by local people as an efficient tool for the management of grassland. Villagers set fire to the area after cutting is over. In addition to human interference, seasonal flooding also influences composition, distribution of species, and size and shape of the grasslands.

Park Management Intervention (1978-1994)

After the establishment of the protected area, the park management authority started interventions to maintain existing grasslands as follows.

Cutting of grass

Cutting of grass was permitted once a year in January for seven days. The duration was later extended to 15 days. During this period, local people were allowed to collect grass from any part of the park.

Fire

Traditionally, villagers set fire after cutting was over. Park staff also initiated controlled burning in phantas.

Introduction of grass species

In order to manage the habitat for the black buck (*Antelope cervicapra*), reintroduced in 1978, dubo (*Cynodon dactylon*) was sown in Bagaura phanta. However, the area was flooded and covered by sand in 1984, which changed the composition.

Ploughing

Tractors were used to plough Bagaura phanta to create a habitat for the reintroduced black buck.

Uprooting of stumps

Small bushes and stumps were uprooted to open up Bagaura phanta to create an ideal habitat for black buck. Despite all these efforts black buck did not survive in the area.

Current Management Practices (1995-1999)

Management Strategy

The grassland management interventions carried out by the park to maintain existing grasslands include allowing local people to cut grass, removing tree species, and controlling invasion of unpalatable species. A joint approach of the traditional practices adopted by the local community, and research recommendations has been followed. However, monitoring of the impact of management intervention still needs to be developed.

Cutting and Burning of Grass

Currently management of tall grass involves widespread cutting and burning of the grassland during the dry season. Since 1994 the duration of permits to cut grass has been reduced to 10 days (in January). Following the harvest, the grasslands are burned by local people and park staff. Burning of grass by local people is done illegally and is also not systematic. Park staff set fire to the grassland in a controlled manner as described below.

1995	Khauraha Phanta	mid February-	end of March
1997	Khauraha	”	”
1998	Bagaura	”	”
1999	Lower Khauraha	”	”

Uprooting of unpalatable species

Invading unpalatable species such as *Lantana* sp. and *Colebrookia* sp. Have been uprooted in Bagaura and Khauraha but not in Lamkauli phanta.

Cutting trees and bushes

Small bushes and selected trees are being uprooted yearly to open up Khauraha phanta. The practice was started in 1995 and was done extensively in Khauraha phanta in February 1999.

Research Activities

Several research studies have been carried out in the grasslands of RBNP (Pokharel 1993; Moe 1994; Karki 1997; Peet *et al.* 1997). Similarly, research done on *Rhinoceros* (Jnawali and Wegge 1992) and buffer zones (Bhatta 1994) in RBNP are also related to grasslands. Some of the findings and recommendations of these research activities are given below.

- The park authority should have a proper monitoring technique.
- The park should try to keep the grass harvest within a sustainable level.
- The existing floristic composition of the grassland should be maintained.
- Organic matter is removed annually by cutting of grass and there is a loss of nitrogen as a result of burning.
- Patches of sal (*Shorea robusta*) forest along the Karnali river should be removed selectively in order to increase the area of grassland.
- Encroaching plant species should be removed.
- Patches of grassland should be left uncut and unburned in a two-year rotation.
- Plans to dam the river that enters the park should be strongly opposed to maintain disturbance from river action and annual flooding, which are important for the persistence of the grassland.
- Management experiments should also be established to investigate the effect of rotational patch management of the grassland.
- Disturbance to ungulates utilising regenerating phanta grassland should be minimised by closing roads.
- The input and output of nitrogen and phosphorus should be quantified.
- The grassland ecosystem can sustain the current level of nitrogen loss. However, several experimental plots would need to be monitored for several years to see whether or not continuous harvest and burning deplete grassland resources.

- The management strategy should include maintaining a mosaic of (tall grass) areas that are cut and burned, and unmanaged.
- Cutting should be done in two phases spaced 20 days to 1 month apart.

In addition to the research findings, some conclusions have been drawn from the ongoing regular management practices. However, systematic research remains to be done to discover whether these practices really improve the condition of the grasslands or not. The lessons learnt are as follow.

- Controlled burning should be done twice a year.
- Fire should be set immediately after October in the daytime when there is wind.
- Fire should be set again after cutting of thatch grass is over in January-February.
- Cutting of grass should also be done twice a year: in January by people, and after June by a park authority grass cutter.

Management Problems

Because of the continuous interventions, not all the grasslands have fully converted to forest, as happened to Mansuri phanta after 1976. However, some problems have been observed in almost all the grasslands. Any kind of management intervention in these grasslands needs to address the following.

- Succession throughout the grassland, such as by *Bombax* and *Acacia* in the Babai valley
- Gradual encroachment by tree species along the boundary of the grasslands in all grasslands
- Invasion by unpalatable species in Bagaura, Khaura, and other small grasslands
- Ungulates, ground nesting birds, and smaller mammals are affected by uncontrolled burning as well as harvesting of grass by local people
- Damage to infrastructure, signposts, and bridges, and harm to animals during the grass-cutting season
- Lack of a proper monitoring system

Research Gaps/Needs

Some research has been done on the species composition of the grasslands, grazing, burning, and cutting of grass. Management interventions have been done in the grasslands by the park authorities based on the recommendations of such research and the experience of local people managing the grasslands in a traditional way. However, long-term systematic study of the impact of such activities still has to be done. For example, the relationship between the increase in the number of permits for harvesting grass and biomass removal needs to be explored in order to limit the permits to the optimum level.

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