Role of Nepal's Royal Chitwan National Park in Meeting the Grazing and Fodder Needs of Local People

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INTRODUCTION

In recent years, the idea has been espoused of a 'holistic approach' to park management that attempts to provide for the subsistence and cultural needs of local people in addition to preserving natural and cultural resources (Dasmann, 1984; McNeely 1984; Machlis & Ticknell, 1985; Zube, 1986; Sharma, 1990). The difficult challenge has been to allow the harvest of renewable natural resources without fostering such a 'Tragedy of the Commons' (Hardin, 1968) as is, seemingly inevitably, associated with unconstrained access to natural resources. Several Authors have suggested that the key to avoiding resource abuse is effective management of the commons by an institution (Netting, 1976; Runge, 1986; Bromley & Cernea, 1989; Feeny *et al.*, 1990).

Royal Chitwan National Park (RCNP) is attempting to protect Nepal's natural heritage while still providing for the carefully managed harvest of natural resources. In this paper, we examine the issue of illegal livestock grazing and fodder-cutting in RCNP, and discuss theoretical and practical policy implications.

BACKGROUND AND METHODOLOGY

Royal Chitwan National Park (RCNP) preserves a nearly pristine area of the Siwaliks hills and river valleys. The hills form the outermost series of low-elevation mountains of the Himalayas and the mosaic of riverine forest, grassland, and subtropical Sal (*Shorea robusta*) forest, supports a wide diversity of native flora and fauna — including several endangered animal wildlife species such as Tiger (*Panthera tigris*), One-horned Rhinoceros (*Rhinoceros unicornis*), and Gharial (*Gavialis gangeticus*). The 932 sq. km Park is surrounded on most of its three sides by agricultural land organized under 34 Village Development Committees (VDCs).

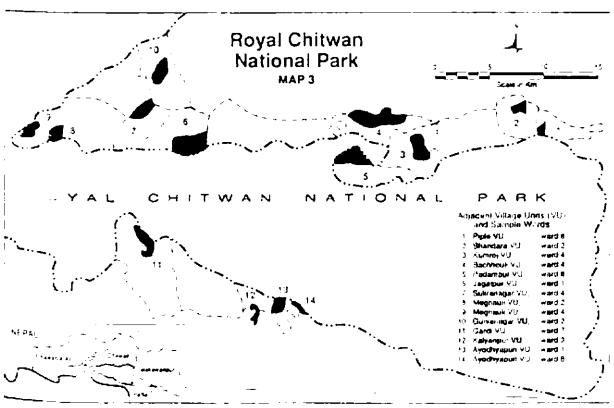

Fig. 1. *Sketch-map of Royal Chitwan National Park and the 16 Village Units Targetted in the present study.*

This study focused on 14 VDCs situated in the Chitwan District (Fig. 1). As each VDC contains 9 wards, there were 144 wards having an estimated total population of 148,404 people in 21,621 households. Nearly all of the VDC areas are separated from the Park by the Rapti or Reu rivers. These rivers are crossable on foot during many months of the year, making it easy for people to cross them for illegal collection of forest produce or livestock grazing. It is equally easy for wild animals to leave the Park and visit the nearby agricultural lands.

Data in this paper are from a larger study that was designed to explore three major areas of conflict between RCNP and its human neighbours: Deficiency of fuelwood in the villages, shortage of grazing lands and fodder for livestock, and crop/livestock depredation by Park wildlife. In addition the research, in order to supplement earlier work (Lehmkuhl *et al.*, 1988), reassessed the benefits which the local people derive from the 15-days' annual grass-cutting that is allowed in the Park primarily for thatching grass and reeds.

Out of the total of 144 wards, 14 wards were randomly selected, and a census of livestock owned by the residents in these wards was conducted. A total of 140 randomly selected household-heads (from the above 14 wards) were asked about different aspects of livestock-keeping. The questions asked could be classified broadly into three themes: (i) issues pertaining to ownership and values of livestock, (ii) places of grazing and sources of fodder, and (iii) factors affecting farmers' decisions on the number of livestock to own, and on the planting of trees for fodder in their properties.

In addition to the survey, 11 patches of grassland or savanna (individually 15–70 ha in size and totalling an area of 365 ha) were selected *inside* the Park but near its boundary. These areas were monitored for livestock uses by visiting each of them once every month through one year on a randomly-selected date. The approximate areas

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of patches were calculated from several width–breadth measurements made by pacing. For details of methods and record-keeping, *see* Sharma (1991).

Results and Discussion

Livestock keeping is one of the main activities of Chitwan farmers. It is fundamental to their subsistence living, and almost every household owns some livestock. On average, a household owns 5.5 animals and 4 domestic birds (Table I). The most popular animals are cattle, but domestic buffaloes, goats, and sheep, are also common.

Most Chitwan farmers selectively stall-feed their livestock (*i.e.* they confine some or all of their animals to stalls for all or part of the year). Those animals which are not stall-fed are generally let loose in the morning and driven to nearby grazing areas. The latter include forests, community lands, fallow agriculture fields, floodplains, and the RCNP itself. In the late afternoon, the animals are driven back to their sheds. Green fodder, grasses, or leaves, are brought home for the stall-fed animals. Fodder is harvested from various sources, including nearby government forests, government or community plantations, floodplains, the farmer's own land, and RCNP. In addition feed supplements, consisting of grains, mill offals (usually grains, pulses, and mustard), and kitchen wastes, are selectively provided — depending upon the age, sex, and the intended use, of the animal.

Table I

*Livestock Ownership in the Villages Near to or Adjoining the Royal Chitwan National Park.**

Livestock	Nr per unit household	Percentage in sample owning such stock
Cattle	2.5	67.2
Buffalo	1.6	51.4
Goats/sheep	1.3	45.8
Pigs	0.1	3.2
Domestic birds	4.0	57.1

* Sample size: n = 2,088 households, except domestic birds where n = 786 households.

Livestock contribute substantially to household incomes. As 42% of the total fodder supply in Nepal has been estimated to come from public forests (HMGN, 1988), livestock in a sense 'bring-in' resources from outside of the farm for the benefit of the farmer. Equally important is the benefit which livestock contribute in generating cash incomes and providing a source of protein to the owners. In addition, oxen are a basic instrument of subsistence agriculture (Harris, 1966). Oxen and male domestic buffaloes provide traction power for tilling and transporting materials in Chitwan.

Since the establishment of RCNP in 1973, one of the resource management policies that has directly affected the local people's life-style is the Park's prohibition of livestock grazing in the forests which are now in the Park. Grazing in the Park is illegal, and the Park is guarded by soldiers of the Royal Nepalese Army (Heinen, 1993). One of the main jobs of the Army is to impound trespassing livestock and present their owners for prosecution.

Implementing this policy that directly interferes with the subsistence pattern of the local people, without provisions for suitable alternatives, has sparked strong conflicts. Despite large numbers of soldiers (one armed guard per sq. km, *see* Sharma, 1990), and substantial fines (doubled since 1988–89), there is no sign of a decline in livestock trespassing in the Park or in trespassing by people for cutting fodder. Because restricting access to Park resources is in conflict with the culture and philosophy of the soldiers, many of them are reluctant to enforce the law.

Although law-enforcement is consequently inconsistent, there appears to be some success in discouraging grazing in the Park. Cattle numbers are growing at a slower rate near RCNP (0.12% per year) compared with the regional growth-rate (1.21%). The difference, however, seems to have been offset by increased numbers of buffaloes and goats (Table II).

The change in the mix of livestock in the region may mean decreased incidence of livestock trespassing in the Park. But it may also mean increased trespassing by people to cut fodder, as buffaloes and goats are typically stall-fed longer than cattle in any given year (Fig. 2).

Table II

Percentage Annual Change in Numbers of Livestock in the Village Units of Chitwan District Adjoining the Royal Chitwan National Park, when Compared with the Regional Growth-rates.

Livestock	Park Adjoining Village Units*	Eastern Development Region**
Cattle	0.12	1.21
Buffaloes†	8.66	3.23
Goats	8.34	3.19
Sheep	(−) 3.15	2.24

* Rate derived by comparing current data with those of Sonnenschein's (1976) data for 1974.

** Source HMGN (1988).

† All domestic, the Wild Water Buffaloes (*Bubalus bubalis*) not being present (*see* Heinen, 1993). — Ed.

A distinct seasonality of livestock grazing and fodder-cutting in RCNP was evident. In the spring season, grazing intensity in the Park was higher than in the other seasons, whereas cutting of fodder was intense in both the winter and spring seasons (Fig. 3). This figure, which is based on data from interviews with farmers, may be somewhat misleading because it suggests that Park land is not used extensively by domestic livestock. The actual extent of grazing by livestock in the Park is indeed far greater, as is indicated by the results obtained from monitoring 11 patches of grassland/savanna in the Park (Table III).

It is tempting to conclude that a healthy wildlife population can be maintained in association with light

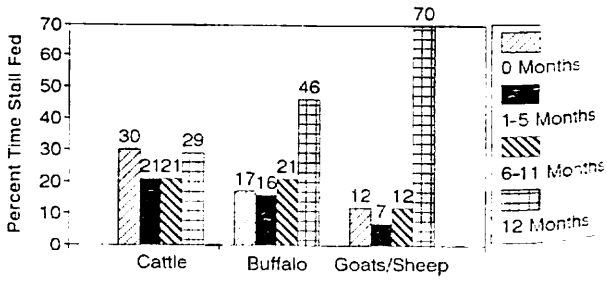

Fig. 2. *Percentage of the time that various livestock are stall-fed in the villages of the Chitwan District.*

TABLE III

Intensity of Livestock Grazing on 11 Selected Patches of Grassland/Savanna in the Royal Chitwan National Park (total area sampled = 365 ha).

Seasons	Mean Number of Heads per Hectare: Cattle	Buffaloes*	Goats/sheep	Total*	Nr of cases
Spring (mid-March – mid-June)	3.7	1.5	0.2	5.4	31
Rest of the seasons (mid-June – mid-March)	2.7	0.7	0.2	3.7	89
Overall Average	3.0	0.9	0.2	4.1#	120

* Difference significant at 95% confidence level.
# Range 0.00 – 21.5; std. dev. 4.24

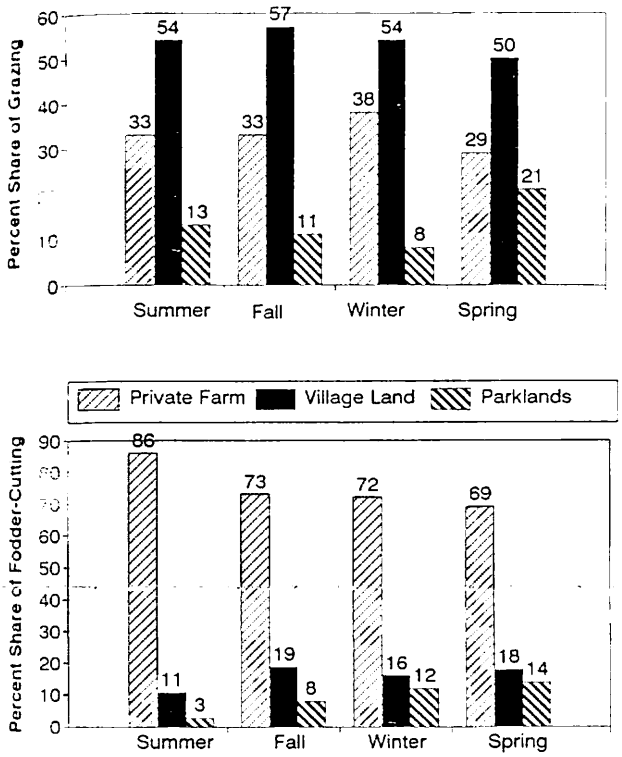

FIG. 5. *Livestock grazing and fodder-cutting (below) as practised by villagers of Chitwan District.*

grazing by livestock (*see* Berwick & Jordan, 1971), or that the Park could be opened for fodder harvesting during critical periods of shortage (Sharma, 1990). The rationale would be that, by being provided with a legal source of fodder, villagers would be inclined to increase the overall proportion of time that livestock are stall-fed and thereby reduce trespass grazing on the Park. However, even if the resource could support such a harvest in RCNP (Lehmkuhl, 1989), our findings based on a survey of villagers showed that the issue is far more complex.

More than 42% of the respondents indicated that they could not promise, or were not sure that they could promise, to stall-feed livestock throughout the year if current restrictions were modified to allow fodder-cutting in the Park. Even more insightful was the response to a follow-up question which was asked of those people who were interested in the idea of allowing a greater extent of controlled grass-cutting in the Park, *i.e.* for fodder. More than 57% said they would increase their livestock, which obviously is not a desired effect. Our analyses suggest that allowing increased fodder-cutting in the Park during the critical period of shortage (the spring season) would, as they said, not greatly increase the overall proportion of time which livestock are stall-fed in a year. Furthermore, the extent of illegal and uncontrolled trespass-grazing would probably remain largely unchanged, because villagers would increase their herds in response to any new source of fodder.

A shift from free-grazing to stall-feeding would affect the division of labour in the household. In a study elsewhere in Nepal, it was found that grazing is supervised mainly by children and the elderly, whereas fodder-cutting requires the labour of strong adults (Fox, 1983). As stall-feeding is much more labour-demanding than free-grazing, greater access to Park resources would simply encourage the villagers to increase the number of animals which they keep, while still maintaining the free-grazing method. It would not motivate them to increase the percentage of time during which animals are kept in stalls. This is consistent with Boserup's model (1965) which suggests that when access to resources is increased, the intensity of resource-use patterns decreases. The farmers will simply act to maximize the value of their labour by keeping more livestock but not reducing the trespass-grazing by these animals. Although Boserup's model was developed in the context of agricultural intensification, its analogy to the use of natural resources should be equally valid.

It has been proven elsewhere that people revert to a less-intensive mode of resource-use when they are suddenly exposed to frontiers (Netting, 1986 pp. 70–1). In fact, Seidensticker's (1976) livestock data from Chitwan aptly illustrate this point, for he found that a village at the Park border supported a density of almost 67% more livestock biomass than a village which was distantly placed from such resources. Owning livestock in areas where forests are freely available for grazing is a more productive use of human labour than working otherwise in order to buy artificial fertilizers and rent or own tractors.

It is obvious from the above discussion that the best approach to this problem is neither strict protection nor widely-expanded access. Enforcement of the laws, in the face of the subsistence needs of the Park neighbours, is simply not feasible. Furthermore, the strategy of expanding controlled harvest of Park resources may be counter-productive because it may not actually result in increased efficiency in the use of the resources.

A successful policy would be a mix of those doctrines. The aim should be to increase the production of essential resources from outside the Park by planting more trees on

private and communal lands. In addition, the Park should promote the efficient use of agricultural residues by adopting appropriate technologies (Sharma, 1990), so that an optimal stable population of livestock for the available resources can be maintained.

The resolution of the livestock conflict in RCNP would require the Park managers to provide leadership by adopting policies that would encourage people to plant trees on their private and communal lands. In addition, the Park should encourage improved management of public forests in the area set aside for local use. The conversion of any open land into cropland and settlements must be stopped, because it inevitably leads to decreased forage availability and concomitantly greater demand for that resource from parklands.

This holistic plan can succeed only if RCNP is allowed to expand its responsibilities to include coordination of new forage production efforts on private and community lands outside the Park. The goal would be to induce a gradual behavioural change, on the part of the farmers, towards stall-feeding their livestock with fodder originating from their own farms and/or from community plantations. Incentive programmes should be carefully chosen to lead to this goal. The success of such a policy requires that both grazing prohibition and prohibition of fodder-cutting are effectively applied in the Park as well as in other neighbouring forests and grasslands.

Acknowledgements

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Summary

It has been increasingly accepted that park management policies in some countries should allow for limited access to park resources by the local people to meet their subsistence and cultural needs. However, too much access to the natural resources of a park may simply cause people to rely on the park resource and manage their own lands less intensively than hitherto.

The issue of illegal livestock-grazing and fodder-cutting in Royal Chitwan National Park (RCNP) by local people is examined. The study area was comprised of 16 village units having an estimated population of 148,404 people in 21,621 households. Despite the presence of a large number of armed guards, the data from interviews with farmers indicated that illegal livestock-grazing and fodder-cutting in RCNP were prevalent. In the spring season, grazing intensity on the Park was higher than in other seasons, whereas cutting of fodder was intense in both winter and spring seasons.

The actual monitoring of 11 patches (totalling 365 ha) of grasslands or savanna for a calendar year inside the Park but near its boundary, indicated that illegal grazing averaged 4.1 head per ha (3.0 cattle, 0.9 buffalo, and 0.2 sheep/goats). In addition, the livestock biomass was found to be increasing by 2.36% per annum in Park-adjoining villages. There is some evidence that villagers adapt their livestock practices in response to the availability (illegal) of grazing in, and fodder-removal from, the Park.

The pressures for illegal access to park resources will continue to grow and eventually will exceed the capacity of the resource to recover from harvest. The best approach to resolve this illegal livestock grazing issue is neither strict protection nor widely-expanded access. The Park should consistently work to induce a gradual behavioural change, on the part of the farmers, to stall-feed livestock from fodder originating from their own farms and/or from community plantation.

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